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BOERHAAVE's
METHOD
OF
Studying Phyſick, &c.

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A
METHOD
OF
Studying PHYSICK.

Andw, Ross

CONTAINING

What a Phyſician ought to know in Relation to the Nature of Bodies, the Laws of Motion; *Staticks*, *Hydroſtaticks*, *Hydraulicks*, and the Proprieties of Fluids: *Chymiſtry*, *Pharmacy* and *Botany*: *Oſteology*, *Myology*, *Splanchnology*, *Angiology* and *Diſſection*: The Theory and Practice of Phyſick: *Phyſiology*, *Pathology*, *Surgery*, *Diet*, &c. And the whole *Praxis Medica Interna*; with the Names and Characters of the moſt excellent Authors on all theſe ſeveral Subjects in every Age: *Syſtematicks*, *Obſervators*, *Operators*, &c. their beſt Editions, and the Method of reading them.

Written in *LATIN*

By the Learned HERMANN BOERHAAVE,
Now Profeſſor of Phyſick in the Univerſity
of *LEYDEN*.

Tranſlated into Engliſh *by Mr.* SAMBER.

Medicum creavit Altiſſimus. Altiſſimus creavit de Terra Medicinam. Eccleſ. cap. 38.

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THE

PREFACE.

T*HOUGH I am not much in Love with* Prefaces, *I find my ſelf at preſent under a Sort of a Neceſſity of doing that for which I have ſo little Inclination.*

This Treatiſe *was written in* Latin *by the incomparable* Boerhaave, *Profeſſor of Phyſick in the Uni-*

verſity of Leyden, *for the Uſe of the Students in that Science, who came to his publick Lectures.*

I ſhall not preſume to draw the Character of this Great Man; he has ſufficiently done it himſelf in the enſuing Treatiſe, *which diſcovers him to be a Perſon of the profoundeſt Judgment and Penetration, of prodigious Reading; and whoſe excellent Qualities ſhine in too bright an Orb to receive any Luſtre from me, ſhould I be ſo vain as to attempt it. There is an Air of Modeſty runs through this whole Work, which ſeems Genuine and Natural; his Criticiſms are juſt, with a great deal of good Humour; and his Impartiality appears in Condemning his own* INSTITUTIONS, *as I ſhall take Notice of by and by. When therefore he commends the* Engliſh *Philo-*

Philoſophers and Phyſicians as the beſt in the World, and has taken Care to make honourable Mention of them in this Treatiſe, *he muſt undoubtedly meet with a generous Reception from them, for thoſe Honours he believes he has juſtly paid them, and which they are Perſons of too much Gratitude not to acknowledge.*

I could ſay a great deal here if I loved Prolixity; but I ſhall therefore content my ſelf.

1. *With relating the Motives which occaſioned the Publiſhing of this Book in* Engliſh. *And*

2. *I ſhall endeavour to obviate ſome Objections which poſſibly may be raiſed againſt it.*

The Motives which occaſioned the Publiſhing of this Book in Engliſh, *are its Excellencies and general Uſefulneſs, which any Gentle-*

man, who will pleaſe to read it with due Attention, will ſoon diſcover.

I ſhall not here launch out into extravagant Encomiums, (a Fault which Authors are too frequently guilty of) upon that divine Science which does not want it, and which does not only make a Man in ſome Sort Arbiter of Life and Death, but qualified to govern Kingdoms. It is well known that the greateſt Princes in the World have had Recourſe to their Phyſicians in Affairs of the higheſt Importance. Not to mention Alexander *the Great, (who held* Ariſtotle *in the higheſt Honour) and ſeveral other renowned Princes; we have a famous Example of this Truth of late Years in the incomparable* Hermann Coryngius *a* German, *who was called from the Profeſſor's Chair*

Chair at Helmſtadt, *to be a Miniſter of State in the* Empire.

The Son of Sirach * *tells us, a Phyſician demands our Honour and Reſpect for thoſe Benefits we may receive from him, as being created by the moſt High; that he ſhall receive Honour from Kings; that his divine Skill ſhall lift up his Head, and that Great Men ſhall ſtand in Admiration of him.*

And indeed it is impoſſible that it ſhould be otherwiſe, for, what great Things is not ſuch a Perſon capable of, I mean, he who is well acquainted with Phyſick in all its moſt uſeful Parts, that knows the ſecret Workings of Nature, the Diſpoſitions and Inclinations of Men, the Influences † *the Sun and*

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* Eccleſ. cap. 38.
† Page 96.

Planets have on human Bodies, and can thence give Judgments and preſage Events? Without which it is impoſſible to be a perfect Phyſician. But—of this no more, of theſe Things the World is not worthy, and wiſe Men keep them to themſelves.

There have been ſeveral great Men who have written De Conſilio Medico; *the famous* Coryngius, *whom I just now mentioned, put out a Treatiſe at* Helmſtadt *in the Year* 1654, *called* Introductio ad Univerſalem Medicam. Schellamer *afterwards put out this Book with excellent Notes at* Spiers *in* Quarto, *in the Year* 1688, *where you will likewiſe find* Gaſpar Bartholin's *Treatiſe* De Studio Medico inchoando & continuando; *as alſo the* Conſilium Medicum *of* Peter Caſtelli.

Vander Linden's *Manuductio ad Medicinam, and* Rhodius's *Introductio ad Medicinam.* Lypenius *likewiſe put out his* Bibliotheca Medica *in* Folio. *But they are all inferior to this preſent Treatiſe of* Boerhaave; *for ſurely the beſt Method of acquiring any Science, is that which is the eaſieſt.*

A good Method of Study is certainly of the higheſt Conſequence; how many a bright Genius at firſt ſetting out in his Studies has been ruined by beginning at the wrong End, or the ill Choice, or too great a Multitude of Books, and has dipp'd into a great many without digeſting any one: This has crowded Peoples Heads with an Infinity of unſhapen confuſed Ideas, and has plunged them into ſuch endleſs Labyrinths that they have not been able to extri-

extricate themſelves as long as they lived.

To remedy this Inconvenience, Boerhaave *wrote this Method, which he dictated in publick to the Students in Phyſick in the Univerſity of* Leyden *(and I could have wiſhed our Univerſities had thought fit to have kept up this good old Cuſtom) and here a Gentleman may not only know where to begin his Studies, what is pre-required thereto, but how to chuſe his Books, and in what Order they are to be read; a Work ſo admirable, that a learned Doctor was pleaſed to ſay, it was the* Phyſicians Dictionary. *And indeed this Book, not only Beginners, but Doctors themſelves may make uſe of in erecting their* Libraries; *for which End I have added to it a copious* Index, *ſhewing not only the Titles of the ſeveral*

ral Books recommended by this great Man in this Treatiſe, but their beſt Editions, and I am well ſatisfied this Book will, by its Directions, make a great Phyſician, and ſave a Man at leaſt ſeven Years time in his Studies.

But this Work is yet farther uſeful, it is not only worthy the peruſal of thoſe who addict themſelves to the Study of Phyſick, but of every Gentleman. For though all Gentlemen do not ſtudy Phyſick, it is however a Qualification for all Gentlemen to underſtand the Principles of Natural Philoſophy, the Proprieties of Bodies and Mechanicks, the Knowledge of which Perſons of the higheſt Rank have not thought beneath their Quality; which is ſo uſeful to them in Architecture, Gardening, Agriculture, *erecting artificial* Fountains, *&c.*

In this Book are mentioned the beſt and moſt celebrated Authors on Mechanicks *and* Experimental Philoſophy. *It being then a* Treatiſe *of univerſal Knowledge, it certainly cannot but meet with a kind Reception from the Learned and Curious, and may therefore be allowed to diſplay its Excellencies in* Engliſh.

This is the leaſt we can do, were it only in Gratitude to him for the Honours he juſtly does the Engliſh *Nation, eſpecially our Phyſicians and Philoſophers.*

What Encomiums does he give of Harvey, Willis, Gliſſon, Wharton, Sydenham, *&c. Sir* Francis Bacon, Boyle, Wallis, *and the Glory and Phenix of our Age, Sir* Iſaac Newton, *who (as this Author very juſtly obſerves *) is*

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* Page 98. line 20.

the Prince of Philoſophers, *and* knows as much as all Mankind together. *And their Characters he gives without the leaſt ſhew of pompous Expreſſion, or extravagant Eulogy, but with that Air of good Humour and Modeſty, as makes his Sincerity unſuſpected.*

A Specimen *of this great Man's Modeſty you find in Page* 320, *where diſcourſing of Dr.* Bennet, *he owns he has had often Recourſe to his Works, when he was doubtful what to preſcribe to his Patients; as alſo in Page* 271, *where he condemns his own* Inſtitutions *as being written in Haſte, and no ways pleaſing to him.*

2. *I ſhall endeavour now to obviate ſome Objections which may poſſibly be raiſed againſt this Work.*

It may be ſaid, That this is the way to make Quacks, and render the Profeſſion contemptible and common.

No Man certainly upon ſerious Reflection will think this any material Objection. I am ſure it is as Ill-natured as Unreaſonable. This is exactly what Boerhaave *himſelf in this Book takes Notice of in* * Bartholin, *who was very much troubled, that the famous Anatomiſt* Michael Lyſerus *put out his Book of the* Order of Diſſection *for the uſe of his Scholars,* becauſe it too much diſcovered his own Profeſſion.

Nor can Books of this Nature encreaſe the Number of Quacks; on the contrary it will confound their Ignorance, and rather frighten

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* Page 246.

ten them from the Practice of what they ſo little underſtand, when they ſhall ſee how much Time and Reading, and what Share of Learning is abſolutely neceſſary to perfect a Phyſician.

It cannot be denied that France *has produced very learned Men in the laſt Century: Men who underſtood* Latin *perfectly well, and yet they rather choſe to write in their own Tongue, though on ſeveral Subjects of the greateſt Speculation in* Divinity *and* Philoſophy.

The celebrated Controverſy De la Perpetuité de la Foy, (*which made ſo great a Noiſe all over the World*) *between the famous Antagoniſts,* Monſieur Arnaud Doctor of the Sorbonne, *and* Monſieur Claude Miniſter of Charenton, *was entirely carried on in* French.

Monſieur L'Abbé Marriotte *wrote his Treatiſe of* Hydroſtaticks *in* French (*now tranſlated into* Engliſh *by* Mr. Deſaguliers) Le Clerque, *his* Oſteology: Tournefort *his fine Treatiſe of* Plants; *and ſeveral others I could mention, who wrote all in* French. *Nor did they apprehend in ſo doing, they rendred the reſpective Subjects they treated on Common or Contemptible.*

It is true, they might have publiſhed them in Latin, *for thoſe Subjects could not be well underſtood but by Perſons well acquainted with that* Language; *but they conſidered notwithſtanding, that there is no* Gentleman *whatſoever, that underſtands* Latin *ever ſo well, but is rather pleaſed with* Treatiſes (*eſpecially uſeful ones*) *in his* Mother-Tongue.

I muſt confeſs, this Method of our Author's cuts the Study of Phyſick very ſhort; but I hope that is no manner of Objection: Men cannot be too ſoon acquainted with ſo excellent a Science which teaches them the way to conſerve ſo valuable a Thing as Human Life, a Thing the moſt frail and brittle in the World. There is no Fear of being too knowing in this Reſpect; there are every Year new Diſtempers, nor can it be otherwiſe while Men indulge themſelves in ſo much Inactivity and Luxury; there will therefore of Conſequence be always freſh Subject Matter for the Learned in this Divine Science, who need not want Employment of Thought. And when all is done that can be to render it as Compendious as poſſible: This is an Axiom of eternal Truth, ARS LONGA VITA BREVIS.

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PAge 23. line. 16. dele *no.* p. 27. l. 1. r. *Pores.* p. 29. l. 12. dele *now.* p. 64. l. ult. for *Sticks* r. *Strikes.* p. 66. l. 12. r. *the Philoſophical Tranſactions.* p. 70. l. 4. r. *perfectly hard and perfectly Elaſtick.* p. 74. l. 14. r. *Stevin.* p. 76. l. 16. r. *Tubo Torricelliano.* p. 80. l. 19. r. *two, viz. Obſervations.* p. 108. l. 7. for 1687 r. 1667. l. 19. r. *Hippocrates.* p. 110. l. 4. r. *Lithiaſi.* p. 121. l. 28. for 1698 r. 1693. p. 126. l. 12. r. *what they are not.* p. 129. l. 4. for *Shell* r. *Bell.* p. 144. l. 21. r. *which may be burnt by Fire, but cannot be mingled with Water.* p. 156. l. 10. r. 10000. p. 159. l. 1. r. *Oſteogeny.* p. 163. l. 19. dele *α* in *μήνιγαξ.* p. 165. l. 27. r. *Lamellatim.* p. 173. l. 28. r. *general as.* p. 178. l. 9. r. *Arachnoides.* p. 189. l. 21. for 1545 r. 1543. p. 190. l. 28. for *thirteen* r. *fifteen.* p. 199. l. laſt but two, r. *Lyſerus.* p. 208. l. 7. r. *Meninges.* p. 219. l. 5. r. *Malpighins.* p. 220. l. 2. r. *Pyerus.* p. 224. l. laſt but two, r. *Graaf.* p. 227. r. *Bellini.* p. 239. l. 7. r. *one Sheet would eaſily.* p. 241. l. 11. r. *Rudbeckium.* p. 243. l. 7. r. *Encheireſis.* l. 16. r. *Ophthalmographia.* p. 246. l. 21. for 1666 r. 1606. p. 260 l. 13. for 1682 r. 1680. l. 6. dele *in.* p. 275. r. Περγϋοπηῶν p. 279. l. 3. *Hygieine.* p. 280. l. 9. for 1650 r. 1560. p. 283. l. laſt but two, r. *Sebizius.* p. 313. l. 12. for 1640 r. 1648.

BOERHAAVE's
METHOD
OF
Studying Phyſick.
In FOUR BOOKS.

BOOK I. PART I.

CHAP. I.

HAVING at laſt reſolved with myſelf to examine after what Method, and by reading what Authors this Science of Medicine or Phyſick may be acquired, and what is its preſent State and Condition in the World, I ſhall in the enſuing Treatiſe ſhew you,

i / m

1. *What Diſcoveries are look'd upon at this Day, as inconteſtable and undoubted Truths.*
2. *I ſhall tell you the Names of the principal Authors, who have been an Ornament to this Science in its reſpective Branches, and who have made any remarkable and uſeful Diſcoveries therein; and,*
3. *I ſhall give you my Advice how, and after what Method, theſe Authors are to be read.*

I. Now Phyſick (or Medicine) is nothing elſe but a Science, teaching how to conſerve the *Life* and *Health* of a *Human Body*, and reſtore to it *Health* when abſent.

From this Definition it neceſſarily follows, that he who is willing to attain a competent Knowledge in Phyſick, muſt chuſe ſuch a Method as may bring him to his deſired End; and therefore it as neceſſarily follows, that Authors who have written on this Subject muſt be carefully read by him; ſo that nothing worthy Obſervation, or what may make for this Science, may eſcape his Notice.

II. This Science then teaches a Man eight Things,

1. *It teaches him what is a* Body.
2. *What is a* Human Body.
3. *What is the perfect or entire* Life *of a* Human Body.
4. *What is imperfect* Life.
5. *What is entire or perfect* Health.
6. *What is prejudicial or detrimental to a healthy* Body.
7. *What Helps and Remedies this* Body *ſtands in need of to repair and conſerve its* Life *and* Health; *and,*
8. *After what Method they ought to be made uſe of in order to eſtabliſh and procure* Life *and* Health; *that is, their certain Doſe, fit Time, and juſt Order and Proportion.*

While I explain to you this Science, and what is its Object, Drift, and Scope in diſcovering the Conſtruction and Frame of this Machine, (our Body) it not only ſhews me what are the *Proprieties* of this our Body, but alſo what is *common* to it with all other Bodies ſubject to the Laws of Nature: A Phyſician therefore ought to have a general Notion or Idea of all this, ſince in a Human Body ſome Things are *common* to it with other Bodies, and ſome Things *proper* only and peculiar to it. A Man in purſuit of this Study muſt not then immediately begin at Anatomy, or any other one Part of Phyſick: for in ſo doing he never will arrive to any Perfection, ſince Anatomy only teaches the Structure of Human Bodies and their Contexture: But a Phyſician muſt know the general Diſpoſitions of a Body, and be well acquainted with thoſe Laws and Affections which are *common* to it.

III. He only is ſaid to be a Phyſician, whoſe Underſtanding has gained ſuch Perfection in this Science, that he can practice or exerciſe it: But to make a Phyſician theſe three Things following are required, *viz.*

1. *That he have a good Genius, and well inſtructed in the Science or Knowledge of Phyſick.*
2. *A Readineſs or Promptitude to exerciſe his Science.* And,
3. *That he exerciſe it for the Benefit of the Sick.*

IV. A Phyſician therefore ought thoroughly to know thoſe eight Theorems before laid down in the ſecond Paragraph, which are there deſcribed, as neceſſary for him to know. For he who deſires to be a Phyſician, ought firſt of all to know what is a *Body*, *Life*, *Health*, &c. before he can be capable of practiſing that Science.

V. Now of all theſe eight a *Body* is the Principal, and therefore the perfect Knowledge of a *Body* ought to be our young Students firſt Care. And by a *Body* I mean *a ſenſible Subſtance endued with certain Proprieties.* He therefore ought to be acquainted with all thoſe Proprieties which are in all Bodies whatſoever.

All Bodies have in them ſome things which are in all Bodies, and theſe are what are ſaid to be *common* to all Bodies.

They have likewiſe in them ſome things which diſtinguiſh them from other Bodies, and which are only *proper* and peculiar to thoſe Bodies: Diſtempers therefore equally ariſe from what are *common* and *proper* to Bodies. If a Man falls down Stairs he will be bruiſed, and this Malady is *contuſive*, ſo called from Gravity, which is common to all Bodies; a Body therefore may be affected with that which is common to another Body. But he who begins his Studies by Anatomy will never know this; the ſame is true of all Parts of a Body; ſo that the vital, natural, and animal Functions, and the other Proprieties of Bodies, equally depend on what is *common* to all, and what is *proper* to ſome Bodies.

VI. For all theſe are to be met with in a human Body, ſince they are *common* to all Bodies.

Thus a general Knowledge is required, that a Man may know what a Body in general is, and that he may find out all the Proprieties of his own Body.

But perhaps it may be ſaid, this Study is fit for the Schools, and out of the Sphere of Phyſick; however, it is what a Phyſician ought to be acquainted with, that he may know all the Proprieties that are in all Bodies.

VII. Theſe Generals, or Things common to all Bodies, are almoſt infinite, but yet may be reduced under three general Heads. Conſider Natural Philoſophy and the Mathematicks, and you will find there is almoſt an Infinity of Things which are common to them with other Sciences.

1. *The firſt of theſe Heads explains the common Idea of all Bodies in general; and this is called* Corporeal Science.
2. *The ſecond will ſhew what Ideas are impreſſed in the Intellect, when the Mind has any Conception of whatever Changes or Alterations a Body undergoes; and this is the* Idea of Motion. *And,*

3. *The third explains thoſe Laws or Rules by which the Nature of things (or God) acts in thoſe Changes or Alterations affecting Bodies, (hinted at in the foregoing Heads;) and this is the* Object of Phyſicks, *or* Natural Philoſophy.

VIII. From whence it follows, that a Phyſician, if he would arrive to any Perfection in his Science, ſhould begin his Studies by contemplating thoſe things which are moſt general in that Science. However, if he ſticks only at Generals, his Life will ſlide away before he can attain to any Knowledge in Phyſick; it will be ſufficient therefore for him in this Acquiſition only to know the general Attributes, Affections, or Diſpoſitions of a Body.

Our young Student in Phyſick ſhould therefore lay a firm and regular Foundation of his Study in a ſtrict and diligent Search and Inquiry into theſe three Heads I juſt now mentioned.

IX. We will therefore ſhew, in as compendious a manner as poſſible,

1. *What are theſe three Heads.*
2. *How they may be known.*
3. *Who are the beſt Writers, or Authors, who have treated of them.* And,

4. *In what Order or Method theſe Authors are to be read.*

X. I ſhall here inquire after what manner a general Idea or Conception of a Body is formed in the Mind.

A general Idea or Conception of a Body is formed in the Intellect or Mind of any one, when he conſiders all what he knows and perfectly underſtands of a Body. For a Body (as I have before obſerved) has ſome things which are common to it with all other things, and has ſome things which thoſe other want. If therefore a Man collects all thoſe ſeveral common things together, and reduces them into one Conception or Idea, he will unavoidably form a general Conception or Idea of a Body.

The Mind or Intellect conceives many things in Bodies; as that ſome Bodies are ſoft, hard, heavy, extended, diviſible, diaphanous or tranſparent, ſonorous, moveable; it likewiſe conceives, that in ſome Bodies ſome things are always preſent, ſome things at one time preſent, at another time abſent; but when a Man retains all thoſe things which are always preſent to a Body, and are common to all Bodies, he has then a general Idea of all Bodies; for Example, I conſider Water and Marble, I find they both have Parts which are meaſurable and gravitate; I conſider alſo that Water has moveable Parts, and that they are tranſparent; that Marble on the contrary is an opacous, hard Body, and its Parts are cloſe and immoveable: Since therefore theſe laſt Proprieties do not agree with both theſe Bodies, I cannot conclude they are common to both; but as the former are always preſent to every Body whatſoever, I therefore conclude they are common to every Body whatſoever.

XI. If our young Student follows the Method ſet down in the preceding Paragraph, he will find that in the general Idea of a Body are comprehended theſe four things.

1. *Extenſion.*
2. *Impenetrability.*
3. *Figurability.*
4. *Mobility* or *Moveableneſs.*

If a Philoſopher and a Phyſician examines what Idea is common to all Bodies, he firſt of all propoſes to his Mind all things which he knows of a Body; and amongſt theſe finds there are ſome which are always, and ſome which are not always in other Bodies; and theſe he will call *Accidental*

dental Proprieties. But his Drift and Scope being to inquire into thoſe which are common only, there is no neceſſity in this Inquiſition to have recourſe to *Accidental Proprieties:* He therefore takes notice only of what are common, and of them forms his Idea; then finds that four things common to all Bodies come into that Idea, of which if one be wanting, the whole Idea of a Body is deſtroyed.

1. *The firſt Propriety of a Body is* Extenſion *and* Meaſure; *but when I ſay a Body is meaſurable, I preſuppoſe it extended; now every thing is extended whoſe conſtituent Parts adhere one without or beyond each other.*
2. *The ſecond Propriety of a Body is* Impenetrability, *which excludes the Congreſs of two Bodies in the ſame Space, or one Body to enter into another. For Example, conſider whether two ſquare Stones of equal Dimenſions will occupy no more Space, if laid together, than one of them by it ſelf.*

I ſay *Extenſion* is the firſt Propriety of a Body; for a Body cannot be impenetrable, unleſs firſt extended, which is plainly evident; for one Body cannot exclude another from the ſame place itſelf is in, unleſs it be extended; if therefore you take away Extenſion from a Body, all things which may be affirmed of that Body are likewiſe deſtroyed, viz. *Impenetrability, Figurability, &c.* It is therefore highly requiſite that we have an exact Idea of Extenſion in every Body.

But if *Extenſion* is the firſt, it is as certain *Impenetrability* is the ſecond Propriety. For it cannot be conceived, how one Body perfectly ſolid, ſhould enter into another Body perfectly ſolid in the ſame Space, ſo that it ſhould be but as one Body; that is, occupy no more ſpace than one Body. Now ſince there is no difference of this in the Idea of any Body, it will be true in every Body whatſoever.

3. *The third Propriety of a Body is* Figurability, *which is a deſcribing the Limits of a Body; for where-ever a Body ends, it finds there its Limits, which conſtitute its Shape or Figure. Limitations, in a Superficies or Surface, &c. are called Limits Mathematical*, Fines Mathematici.

4. *The fourth is* Mobility *or Moveableneſs, which is a Power of being where-ever another Body is abſent; and whatever Conception or Idea you have of Motion, it is certain you may conceive a Body*

Body to be now in one Place, and now in another; to be now here and now there.

Hence it evidently follows, that a Phyſician, after he has throughly examined every thing that may be ſaid of a Body, will not with *Deſeartes*, lay it down for an undoubted Truth, that the Nature of a Body *eſſentially* conſiſts in *Extenſion*; but rather that *a Body is a thing extended, impenetrable, figurable, moveable*; for no Man in the World ever knew what a Body *eſſentially* is but only its Proprieties, and therefore the *Ariſtotelian* Definition of a Body (*viz.* Triple or Trine Dimenſion) is not perfect; for a perfect Definition requires a perfect Notion or Idea of the thing defined; but if there are more Proprieties than one in any thing, they ought to be mentioned in the Definition of that thing.

And therefore in Phyſick, the firſt Subject of all is, that we know what *Extenſion* in a Body *properly* is, what *Impenetrability*, *Figurability*, and *Mobility* or *Moveableneſs*.

XII. Of theſe four Proprieties, that which is the Foundation of the reſt, and conſequently what is firſt in our Conception,

tion, is CORPOREAL NATURE, or the Nature of Bodies; all other things which are contained in that Idea are called Corporeal Proprieties.

We ſee then that no one can have any Idea of a Body, but muſt at the ſame time have an Idea of theſe four. The Queſtion now is, which of theſe is in *reality* the firſt; I do not ſay, which obtains the firſt Place as to Order, or in our *Conception*; but which of theſe four Proprieties, excluſive of the other, is in *reality* the firſt exiſting in a Body. Let us then ſee what may be ſaid of *Mobility* or *Moveableneſs*; but that will not take up much time to determine, for a Body muſt firſt be extended before it can be moved. The ſame may be ſaid of *Figurability*; for Figure ſuppoſes Limits, and therefore ſomewhat precedes Figure, and conſequently Figure cannot be firſt; or can we conceive *Impenetrability* or *Extenſion* to be *really* ſeparate from, or excluſive of each other? No, the moſt ſimple Idea then which we can have of a Body, is, that it is *a Thing extended and impenetrable.*

A Phyſician therefore lays down this as a fundamental Truth, that a Body is extended and impenetrable; but all other things that it comprehends, if they are inſeparable from it, are called PROPRIETIES;

TIES; if ſeparable, ACCIDENTS: I conceive, for Example, a Sphere, and that to be extended, and impenetrable, but take away theſe, and the Sphere is deſtroyed. I likewiſe conceive it to be Figurable and Moveable, but theſe may be changed, and therefore are Accidents; for Site does not depend on the Nature of a Sphere, but from other Cauſes, *viz.* circumjacent Parts, and therefore may be either preſent or abſent.

XIII. The true Definition then of a Body is, that it is *a Thing extended and impenetrable.*

XIV. And its individual Proprieties are *Figurability* and *Mobility.*

XV. EXTENSION *is a Poſition of Parts (compounding or conſtituting the whole) one without or beyond each other*, and is meaſured from one Point by three Perpendiculars mutually cutting each other in the ſame Point. It is a Demonſtration in *Euclid*, that from a Point given on a Plain, it is impoſſible to draw from thence more than two Perpendiculars; and therefore every Plain or Superficies is only meaſurable by two Perpendiculars, *viz.* Length and Breadth; and hence every Plain or Superficies is call'd double or two-fold Dimenſion; this being allow'd, if a Point be not taken from the Superficies, but from the Space within, then in ſuch Caſe there can be no more than three Perpendiculars, as is evidently demonſtrated in *Euclid.*

All Extenſion therefore is meaſurable after a triple or three-fold manner, as *Galileus* very well concludes: For whatever thing I conceive to be corporeal has theſe three Proprieties. A Cube is a Body terminated by ſix quadrate Superficies, and by theſe all corporeal Space is meaſured; the Sides are call'd reſpectively either Length, Breadth, or Depth. If therefore by theſe we meaſure all Bodies, when we come to know theſe, we know all Extenſion, and conſequenly all Bodies.

From the Nature of Extenſion follows *Diviſibility*, becauſe to be extended ſignifies to have Parts ſtanding out of other Parts, and conſequently *Diviſibility.* If I take a Line, and divide it never ſo much, I ſhall never divide ſo much that I can divide no more; and if I could, yet the extreme Parts would be extended. Every Line therefore is not compoſed or made up of Points but Lines, nor every Superficies of Lines but of Superficies, and a Cube of other Cubes *in infinitum.*

XVI. IMPENETRABILITY is the Idea of *Extenſion* together with an infinite Reſiſtance of one impenetrable againſt every other impenetrable, which ſtrives to come into the ſame Space with that impenetrable.

Suppoſe you claſp both your Hands together, and imagine in the Space between them there is plac'd an impenetrable Body: If then a ſecond Body would come into that Space occupied by the firſt, and the firſt Body reſiſt it, it will be impenetrable by any (tho' an infinite) Force. If it gives way, it will be condenſable, becauſe of its Rarity and Porouſneſs: But a perfect Solid, if its whole Nature makes uſe of all its Power, cannot give way, becauſe it is impenetrable; as long therefore as Impenetrability remains, the ſame Extenſion will remain. But if a Body gives way as to one half, one half of it will be impenetrable, and the other condenſable. And thus, if a Grain of Gold be ſuppoſed to be in the very Centre of the World, if then it be preſs'd by every *Radius*, and reduced to half as little a Space as it was before, it cannot be ſaid to be impenetrable, but condenſable as to one half, and impenetrable as to the other.

XVII. Every thing therefore which is impenetrable is extended, but every thing that is extended is not impenetrable; for what is impenetrable occupies a Place in ſuch manner that it reſiſts with infinite Force: It occupies a Place, therefore it has Parts ſtanding out of each other.

If you ſeriouſly reflect on this, you will find the Ideas of Impenetrability and Extenſion are diſtinct Ideas. If, for Example, I hold between my Hands a Body moſt ſolid, which is thence taken away, and no other Body come in its Room, no Abſurdity can follow, if I conceive the ſame Extenſion; but yet it cannot be ſaid I conceive another Body to be in the ſame Place; we ſee then that the Idea of Extenſion does not involve, or imply Impenetrability.

XVIII. Every *Impenetrable* therefore will be found to be *meaſurable*, and conſequently *diviſible*. *Meaſurable* is that in which may be aſſigned a certain equal Number to be in meaſuring: To meaſure therefore is to aſſign how often a Meaſure can be apply'd in meaſuring; and conſequently every thing that is *impenetrable* is *meaſurable*. But Meaſure ſuppoſes Extenſion or Parts, and ſince one Part of it can be conceived to ſtand out of other Parts, it is certainly *diviſible.*

XIX. Every Impenetrable therefore may be divided into infinite leſſer (and always diviſible) Parts. Now every Impenetrable, as we ſee in the foregoing Paragraph, has diviſible Parts, but theſe again have (as we ſuppoſe) their ultimate or extreme Parts either ſeparate or not; if not, then two Parts, if they are join'd together, will penetrate each other, or all the ſame Superficies will meet together, which is abſurd: Therefore again, I ſay, they have Parts; but if they can be united in their Subſtance, then I conceive it to be one Thing, not to be two Parts, and therefore I call it one Thing. Again, I conceive a Body compoſed of 100000 Parts, if I conſider two of them, and they mutually penetrate each other, they are only one Thing; if four, and they penetrate each other, they are but one Body, and ſo *in Infinitum.* Therefore every impenetrable Body is compounded of infinite extended impenetrable Parts, that is, no Body whatſoever loſes its reſiſting Force or Power.

XX. Every Body therefore ſtands in need of ſome Cauſe to make one impenetrable Part cohere or join to another: Every Body dy which is impenetrable, is impenetrable in one Part or other, and every Part has its own Impenetrable: Hence the Idea of *Impenetrability* and *Extenſion* implies nothing but a Poſition of one Part next another.

Coheſion is ſuch a Contact which is repugnant to Separation; if I have two Bodies, one exiſting here and another at the ſame Part, there is a *Coheſion* between theſe two, and I cannot move one without moving the other, ſo cloſely are they united; therefore they cohere or ſtick together: The Idea therefore of *Coheſion* is not included in the Idea of *Impenetrability* or *Extenſion*. As often as in any Idea I conceive another Thing which does not belong to it, I ought to call in to my Aſſiſtance a ſecond Idea; and if that is not enough, a third, *&c.* For Example, if I conceive a Triangle to have three Angles, and that it is moved, tho' I conceive the Cauſe, yet that Thing is ſaid to want a Cauſe.

Hence between Sir *Iſaac Newton* and the *Carteſians* has ariſen this Queſtion, Whether the Idea of *Coheſion* is any wiſe imply'd in the Idea of *Extenſion* and *Impenetrability*?

XXI. This Cauſe of *Coheſion*, a Thing

the moſt unknown in the World, we call *Unity*, *attractick Virtue*, or *Elementary Virtue*, or what elſe you pleaſe: But theſe are the Effects, not the Cauſe of *Cohesion*; for no Body can be ſaid to be really one, ſince every Body is compounded of two Parts, or Moieties: Since therefore the firſt Body lies immediately next the ſecond, I ſhall diſtinguiſh this Cauſe by ſome Name, either by that of *Unity* with *Democritus*, or *attractick Virtue* with Sir *Iſaac Newton*.

XXII. The Effect of this we call *Hardneſs*: A hard Body is that which cannot be ſeparated, tho' ſeveral Men forcibly draw it backwards and forwards by different Movements; but its Parts ſo cohere, as to reſiſt the Power of Separation. Now if a Body is of ſuch a Hardneſs as to affect the Senſes, it is called *ſenſibly Hard*: But I challenge *Deſcartes* and other Philoſophers to explain the Nature of Hardneſs; for they ſuppoſed it to conſiſt in the Reſt or Quieſcency of the Parts cloſe to each other: But if one Part of a Body is mov'd, it communicates its Motion to the next Part; therefore its Reſt or Quiet is deſtroy'd, and that Body muſt be ſeparated. Reſt of Parts therefore is an Effect, not the Nature of *Cohesion*. *Bernouille* therefore and others, who have treated of the Nature of Things, ſuppoſe Bodies to be hard, without inquiring into the Nature of Hardneſs.

XXIII. If this Coheſion or Hardneſs in any Part is ſuch as exceeds all known Power of Separation, it is called an *Atom*, or a Corporeal Element. And for this *Democritus* was falſely accuſed, as if he did not underſtand Geometry; though certainly he was the moſt skilful in that Science of any one whoſoever; his Doctrine was, that Nature was ſo framed, that there were Bodies ſo cloſely united as no natural Force could ſeparate and divide them; and this he demonſtrated from the Perpetuity of Nature: For there is no Diverſity perceiv'd in the Parts of Water, Air, Fire and Earth, and they are never changed in their Eſſence; they therefore ſo cohere as they cannot admit of any Change; for if many Things ſhould reſolve themſelves into the Element of Fire, its Power muſt neceſſarily for that Reaſon be the greater, and Heat in the Earth conſequently more intenſe; but ſince for almoſt ſix thouſands Years it has been obſerv'd, that all Things have been the ſame, and have had the ſame Proprieties as now they have; if then the

Seminal Principles were changed, no old Body could ever be renewed like what it now is, but all Things would be quite different: But ſince almoſt nothing is deſtroy'd, you ſee from all theſe it follows, that that firſt Thing in Nature muſt of neceſſity immutably cohere, not mathematically, but that there is no Power poſſibly that can leſſen or deſtroy it; the true Cauſe which makes extended and impenetrable Parts thus cohere, is the Order of *Nature*, or God himſelf its Author.

XXIV. Granting then there be ſuch a Thing as an Atom (deſcribed in the preceding Paragraph) or a Body made up of Atoms, if it has its Parts ſo cohering, that no void Space can come between thoſe united Parts, then that Body or Atom will be perfectly ſolid. To this the Followers of *Ariſtotle* and *Deſcartes* anſwer, that Extenſion is the Idea of Solid and Impenetrable. An Atom conſiſts of infinite Parts with intercepted Spaces, and therefore is not perfectly ſolid. Thoſe little intercepted, or interſperſed Spaces between the cohering Parts I call Vacuities or Voids; if then the Parts ſo cohere, that there be no intercepted Space, it is perfectly ſolid, that is, if the Superficies of the Parts are ſo joyn'd together, that between the Superficies no Space can be admitted, it is even the moſt ſimple Body, inaſmuch as it is made up of Bodies perfectly ſolid, without any intercepted Space.

If it be enquir'd by what Meaſure a Solid is meaſured? I anſwer, by that of Space. Suppoſe, for Example, a cubical Space of one Foot, which a Body wherein there is no *Vacuum* or Void may fill; now Extenſion alone cannot be meaſured, for that Body may otherwiſe be rarified, but an Impenetrable occupies properly that Space.

XXV. If an Atom or Body have impenetrable Parts ſo conjoyn'd as to admit [illegible] little Voids between its united Parts, or if it be filled with other Matter, it is called a porous Body.

Suppoſe, again, a Cube of one Foot, whoſe Parts are ſo united, that one half is ſolid, the other void, ſuch a Body ſeems to occupy the whole Space, ſince it is extended to the whole; but in reality it only occupies one half Part or Moiety: We muſt not therefore ſay a Body is ſo large becauſe it occupies ſo much Space, but an impenetrable ſolid Body occupies ſo much Place, and a porous Body ſo much: Theſe two being therefore added together it is ſo large. This is uſeful in moving corporeal Powers, becauſe the Quantity of Matter ought to be firſt known.

Philoſophers call an Element a moſt ſimple Body, out of which ſimple Bodies compound Bodies are formed,. and into which they are reſolved.

XXVI. Sir *Iſaac Newton* and *Hugens*, Men that have flouriſhed in our Days, have both diſcovered, after a different Manner of Reaſoning, that corporeal Matter, in whatſoever Space it be, has the ſame Proportion as a Weight to the Thing it weighs.

Corporeal Maſs is all that which we ſee.

Corporeal Quantity is a Collection of Impenetrables perfectly ſolid which is in a Maſs.

Sir *Iſaac* diſcover'd, that all that which we call interſperſed between the Pores is the ſame as a *Vacuum*. [*Nat. Phil. 3d Part.*] Suppoſe a Box of a certain Size, either full, or not full of Gold, but perfectly cloſed, the *Phænomena* or Appearance would be all one: Now as he ſuppoſed there was Matter between the Pores in the Experiment, he thought ſome other Thing ought to effect it, when yet it cannot act; for Example, if between the Cylindrous Pore of Wood, ſubtile Matter would act, it would put on the

Matter of the Solid; if therefore ſuch like Bodies can act without it, becauſe only Weight gives Percuſſion, *&c.* Hence it appears, that this ſubtile Matter is not: Wherefore, if I know that one Body of one Foot weighs one Pound Weight, and another Body of one Foot weighs two Pounds Weight, I know there is twice as much Void or *Vacuum* in the former as in the latter. *Hugens* by Experiment ſaw the ſame Truth; but as he was a perfect *Carteſian*, he wrote nothing of this Subject after he had ſeen Sir *Iſaac Newton*'s Book; and therefore he ſaid, that every Thing which weigh'd, or was ponderous, was Mathematically ſolid.

The Quantity of corporeal, impenetrable Matter in every Space is known by its Weight, ſo that if we could have only one Body perfectly known to us, we might explain all Bodies, but there is no ſuch Thing in the World: Gold ſeems to be ſolid, but it is demonſtrated by its Sound, the Microſcope, *&c.* to be porous; therefore our Science can only be known, inaſmuch as it is relative; and ſo alſo the Nature of Hydroſtaticks in relation to what Force and Power Bodies have. See the laſt Line but one in Sir *Iſaac Newton*'s Natural Philoſophy, *Part 3d. Traite de la Peſenteurs*; *pag.* 163. by *Hugens*.

Corporeal Quantity therefore is found by finding out its Weight, and the Proportion of the *Vacuum* or Bulk of a Thing ſhews us what is Proportion.

XXVII. From corporeal Nature therefore may be had the Idea of Diverſity.

Hitherto we have ſeen that an indiviſible conſiſts of infinite Parts, which being united by ſome Power make an Atom, which alſo has Gravity; and therefore it is evident that extended, impenetrable Matter, formed into certain Parts which cannot be changed by any Power whatever, have a Gravity perfectly proportionate to the gravitating Maſs.

Of the Diverſity of Atoms.

1. *One Atom is not ſo large as another, if it be diviſible.*
2. *It is not requiſite that it be equally ſolid.*
3. *The Figure of this Atom may be different from that, and conſequently it is not neceſſary that the Elemental Parts be both alike.*
4. *One Atom as well as another may be united by a greater or leſſer Coheſion.*
5. *One Atom, or one Body, according to the different Manner of uniting, may under a different Reſpect be porous, that*

that it may ſometimes intercept pores, and ſometimes not.

A three-fold Diverſity therefore reſults from the Elements, which I ſhall reduce to three chief Heads; *Cohesion* is the only Elementary of which now is the Queſtion; and hence ariſes *Diverſity*, *Denſity*, and *Porouſneſs* or *Poroſity*.

XXVIII. The firſt Thing therefore that a Phyſician ſhould know, is the general Idea of a Body; and all thoſe Things which immediately flow from it we have therefore explained:

1. *Extenſion*,
2. *Diviſibility*.
3. *Impenetrability*.
4. *Hardneſs*.
5. *An Atom*.
6. *Solidity, or abſolute Denſity*.
7. *Porouſneſs, or Poroſity*.
8. *Meaſure of a perfect and imperfect Solid*.
9. *The triple Diverſity of Bodies from the very Nature of Elements*.

XXIX. Theſe nine Articles are the moſt neceſſary and uſeful Fundamentals for Phyſicians and Natural Philoſophers.

A Natural Philoſopher is he who knows the Power of Things corporeal, and theſe depend on Corporiety and Motion, but Corporiety has nine Heads or Generals: Natural Philoſophy is therefore contained in theſe, and of theſe no one can make any manner of Doubt.

A Phyſician is he who ſearches into that Part of Nature which is called a Human Body, and is acquainted with the Powers of a Human Body on other Subjects, and how they again act upon a Human Body. He therefore muſt underſtand the Powers of a Body as well internal as external; and therefore,

He who will diligently and in earneſt ſearch into theſe Things muſt read,

XXX. The Principles of *Democritus* and *Epicurus*, the ancient Philoſophy of the *Phœnicians* and *Egyptians*, which he will find excellently well deſcribed in *Lucretius Carus*, and which contains what is moſt remarkable in the Nature of Things.

2*dly*, He muſt read *Diogenes Laertius* of the Life of Philoſophers, eſpecially the Life of *Democritus* and *Epicurus*: But if he would perfectly know all theſe, let him read that great Man *Peter Gaſſendi*, *viz.* his Commentary upon the tenth Book of *Diogenes Laertins*, put out in a ſeparate Edition

dition in *Quarto*, theſe three have all what is moſt conſiderable in the nine foregoing Articles, but perhaps *Gaſſendi* alone is ſufficient.

But he who has a Deſire to penetrate the inmoſt Receſſes of the Mathematicks muſt read Sir *Iſaac Newton*, and *Hugens De la Lumiere*, *& de la Peſanteur*, and theſe you may find in *Keil*'s Introduction to true Phyſicks or Natural Philoſophy.

I have now finiſhed the firſt Part of the Study of Phyſick, it remains ~~now~~ that we ſay ſomewhat of the Figure of Bodies; but in this we muſt have ſome Recourſe to Geometry.

PART II.

CHAP. I.

Of the Figure of Bodies.

WHEN a Phyſician has known the general and common Nature of Bodies, he will eaſily know that all Bodies are finite: But this cannot be gathered from the *Carteſian* or *Ariſtotelian* Philoſophy; for according to *Deſcartes*, Extenſion is the ſame Thing as a Body, and therefore that being infinite, according to him, a Body muſt conſequently be infinite: But by our Philoſophy a Body is finite; and thereupon *Gaſſendi* had good Reaſon to ask this Queſtion, *viz.* When ſhall we come to the Superficies of the World? If it be finite, what will be beyond it? Surely Extenſion; but according to the *Carteſians* it will be a Body, according to us that Extenſion is a *Vacuum* or Void: But as a Body is finite it has Bounds or Limits, which are call'd the Superficies, and this extream Part may wear different Forms, or (more properly ſpeaking) *Figures*.

Figure is the extream Shape of corporeal Extenſion: Or in other Words the Superficies of every Body; every Superficies therefore, which is ſimple Figure, has nothing in it corporeal: Superficies is the Extream of a Body, and Figure is only the Superficies of Form. This extream has nothing of Denſity in it, but encompaſſes a Body as to Length and Breadth; ſimple Superficies therefore is called two-fold Menſurability: You ſee Geometricians never meaſure a Body, but the Superficies, and very often its Length only; a Phyſician therefore, that he may know what Bodies are, ought to know the Figure of a Body.

II. On the Knowledge of a Superficies depends the Art of meaſuring corporeal Space; on the Meaſure of corporeal Space depends the Meaſure of Power; and therefore a Phyſician who is intent to know corporeal Powers cannot want the Knowledge of the Meaſure of Superficies.

It is moſt evident from Geometry, that he who knows how to meaſure a Superficies, from thence knows how to find out what is the Area or Space contained in that Superficies ; he ought alſo to know the Swiftneſs of a moved Body and its Magnitude : Now as Magnitude depends on a Superficies to be meaſur'd and conſider'd, ſo he who ſtudies corporeal Powers ought to know how to meaſure Superficies ; and thus we ſee the Art of Meaſuring to be uſeful to a Phyſician, which *Hippocrates* alſo well obſerves in his Epiſtle written to direct his Son in his Studies, wherein he tells him, that he ought to apply himſelf to Geometry before he ſtudied Phyſick.

III. Every Limitation of a Superficies is called Figure by Geometricians : No one can know what is Magnitude, unleſs he knows what is Superficies, which being limited, is Figure :. The Conſideration therefore of Figures is very neceſſary for a Phyſician, and requiſite in every one that ſhall undertake to explain corporeal Powers.

IV. All Superficies are known by knowing firſt the Meaſure of Lines. I ſhall now demonſtrate how every one may eaſily and briefly know all what a Phyſician ought to know in relation of Figures: Now ſince every Phyſician ought to know what are corporeal Powers, and conſequently Celerity or Swiftneſs and Magnitude; but as he cannot find out what is Magnitude, unleſs he knows what is a Superficies, nor what is a Superficies, unleſs he knows firſt what are Figures, nor Figures without being acquainted with right Lines; the firſt Thing therefore that a Phyſician ought to know in Geometry, is, what are the Objects of right Lines.

V. But in theſe Lines, as well as in Superficies, and in Bodies themſelves, Geometry conſiders what is,

1. *Magnitude.*
2. *Increaſe.*
3. *Decreaſe.*
4. *Proportion to other Things of the ſame Kind.*
5. *Tranſmutation into other Things of a different Nature, but of the ſame Magnitude; and this is all that Geometry conſiders.*

1. If a Geometrician knows what is a right Line, he at the ſame time knows what are a great many; for what *Euclid*, *Archimedes*, and all other Geometricians

have demonſtrated, was ſo done by conſidering Magnitude or Extenſion, which comes between given Limits; a Line is a Point to Lines; a right Line is a Diſtance directed between one extream Point and another; a Superficies is an Extenſion between four Limits; I affirm that little Cube to have Magnitude, whoſe lower and ſide Superficies I know, which being multiplied by themſelves together with Altitude or Depth ſhew its whole Magnitude, that is, its Extenſion between ſix Plains or Superficies.

2. The ſecond Object of Geometry is *Increaſe*; for I cannot conceive Extenſion, but at the ſame Time muſt conceive another Extenſion beyond it, which circumſcribes or encompaſſes my Extenſion. Now a Geometrician does not make this Extenſion, but thinks it only augmented, or has a farther Thought beyond the Limits firſt given. If I conceive a Superficies, I conceive Limits; if I think farther, I am ſaid to encreaſe Extenſion; but this is not an Addition, but a farther Extenſion of my Idea.

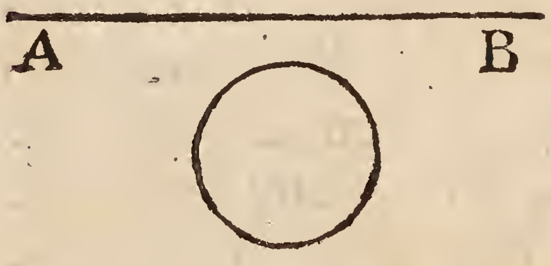
3. The third Object is *Decreaſe*; if any one attentively conſiders this, he will find that *Increaſe* is the Multiplication, and *Decreaſe* is the Diviſion of Lines and Superficies; for Example, I take one Line, I aſſign

I aſſign ſome Parts contiguous to each other, where there are given ultimate Parts, as well from one Extream as from the other; if then a Geometrician divides this Line in three equal Parts, he forms in his Mind an Idea or Conception of three Lines, one of which is a third Part of the whole; but to multiply is when I make this one third Part of a Line three times as much as it ſelf, ſo that the whole divided Line, conſiſting of three Parts, be made one whole one; to add and multiply then is to encreaſe Extenſion, and to divide it is to diminiſh or decreaſe it; for Example, to conceive a leſſer Limit.

4. The fourth Object is *Proportion*: Treating of Proportion is the very Marrow of Mathematicks. Suppoſe a Line given, here is finite Extenſion; then ſuppoſe another Line alſo given; if any one now would deſire to know the Proportion between them, firſt, let him inquire into their ultimate Parts, how many there are in one as well as in the other; if there be 100 in one, and 50 only in the other, it will be but a half Proportion; which Invention or finding out of common Meaſure by two Things extended, Geometricians call *Ratio*, that is, Rule or Meaſure; that is, when two Magnitudes of the ſame Kind are compared with each other,

what Meaſure there is reſpectively between them. Now firſt Proportion is an Equality of Meaſure, as when having four ſeveral Qualities, I ſay, as one is to two, ſo is three to four, and this is called ſimply by the Name of Proportion. Secondly, Proportion requires that the Quality of Meaſure be known. Thirdly, how the Thing to be meaſured contains Meaſure, and by theſe Proportion in Things that have Extenſion is known.

5. The fifth Object of Geometry is *Tranſmutation*, and this moſt noble Part is called the Intenſion or Conſideration of Quadratures or Squares. I never heard of right Lines changed into crooked Lines, but on the contrary crooked into right Lines. For if you conſider a known right Line *A B*, and would have me make a crooked Line in the higheſt Degree, which may be equal to the Magnitude of the Line *A B*, I then make a Circle, and find the right Line in a Circle; but if you would have me make this right Line equal to the whole Superficies of an *Ellipſis*; it does not appear how theſe Quadratures or Squarings of right Lines can



ſcarce poſſibly be changed into crooked Lines, but it is eaſily known that crooked Lines are formed of crooked Lines, Superficies of Superficies, *&c.* If any one would change a Quadrate or Square into a Triangle, he may eaſily ſee this demonſtrated in the Elements of *Euclid*; and therefore the Area of the ſame Extenſion will remain, and the whole can only be changed into various Triangles: If a crooked Figure may be changed into a right Figure, its Quadrature is called firſt of all a Tranſmutation of a Superficies comprehended by crooked Lines into right Lines; but ſuch Quadratures never yet have been found out; and about this Mathematicians buſy themſelves to this Day; and theſe five Objects are all that Geometry conſiders in relation to all Lines whatſoever.

VI. If a Man would come to the Knowledge of theſe after the eaſieſt and ſhorteſt Method, he muſt firſt be acquainted with Arithmetick, and the beſt (tho' not perfectly) of all Authors that I have hitherto been acquainted with, who have treated of this Subject, is *Andrew Taquet.* This Author has put out a Book in *Octavo*, wherein he treats every particular Article after the eaſieſt, and moſt ſimple Manner;

but if you would have a larger Work, read a Treatiſe put out in *French*, in two Volumes in *Quarto*, by C. C. *Preſter*, entituled, *Elemens de Mathematique*, where all Things are clearly explain'd, and you may learn it without a Maſter if you have Patience, and theſe two Books are ſufficient. The Reaſon why Arithmetick is neceſſary to be firſt acquir'd, is, becauſe we cannot caſt up or compute Meaſure or Magnitude without Numbers, for meaſuring is numbering; you ought therefore to learn Arithmetick as far as Multiplication, Diviſion, Fraction, and the Golden Rule, or Rule of Three.

After this read the firſt ſix Books of *Euclid*, that is, his *Elements*: The beſt Edition of theſe is that of *Furnier*, with *Melder*'s Notes; but if you would proceed farther read the fifteen Books of *Euclid* put out by *Barrow*, (but the *London* Edition is by much the moſt correct;) he was a Philoſopher, Phyſician, Divine, and excellently skill'd in Muſick, and corrected and amended all the Faults and Miſtakes in *Euclid*: But if you would read theſe to the greateſt Advantage and Profit, you muſt ſtudy at the ſame time *Clavius* upon the fifteen Books of *Euclid*; that printed at *Rome* is the beſt Edition, in two Volumes in *Octavo*; but it was a

Misfortune in *Euclid*, that he never obſerv'd Order; for Order requires to treat,

1. *Of right Lines.*
2. *Of inflex Lines.*
3. *Of crooked Lines.*
4. *Of Superficies* : And,
5. *Of crooked Figures ; but firſt of Triangles ; for by Triangles all other Superficies are meaſured.*

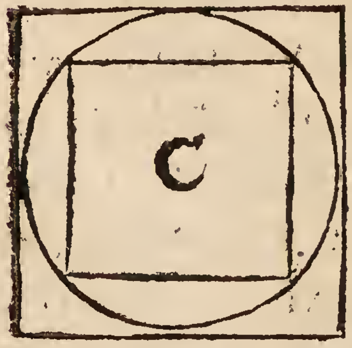
If to theſe you add whole and broken Numbers, *&c.* you will know all that is contained in this Book, and may proceed without a Maſter.

If you make uſe of this Method in your Studies, I would adviſe you likewiſe carefully to read a Book put out at *Paris* by *Bernard Lami* (*Prete de l'Oratoire*) Prieſt of the Oratory, in *Octavo*, in the Year 1655, entituled, *Elemens de Geometrie ou Traite de la Meſure de Corps.* This Book I particularly recommend to you, for it is moſt excellent and valuable, and really *a Golden Treatiſe*, admirably explaining the moſt material Points in *Euclid*, *Archimedes*, &c. There is another beſides *Lami* that has written a Treatiſe in the ſame Method, but it is very defective and full of Miſtakes.

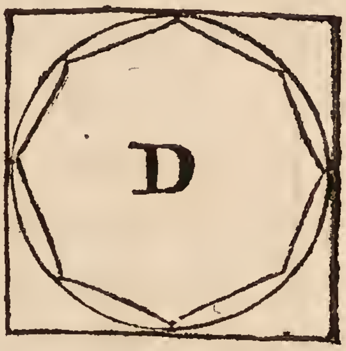
VII. Figures (or corporeal Superficies) curved and irregular are underſtood by appointed Plains, and are thereto reduced; ſo that if you know the former, you underſtand the latter.

Superficies is the Extream of a Body diviſible according to Length and Breadth: Figure is a limited Superficies which gives Shape or Form; a plain Figure is that to which a right Line every way applied has Congruity or Agreement, when the Superficies of a ſuppoſed Line does not any wiſe emerge, but lies cloſe and contiguous; a ſwoln or gibbous Figure is a Superficies not plain which winds round like a Sphere, for in this a right Line applied does emerge, that is, does not touch in all Parts, but in one Point only.

All curvilineal Figures are meaſured by right Lines in ſuch manner as the ancient Geometricians made uſe of. Imagine a Circle, the Centre of which is a plain Figure C. I inſcribe a Square, and ſay this Square is leſs than the Circle: I then circumſcribe a Square, and ſay this Square is larger than the Circle: If therefore I find the Magnitude of both Squares, and divide their Difference into



two Parts, I come nearer to the Magnitude of the Circle. If after this I inſcribe an *Octogon D.* and take away the former inſcribed Magnitude from the circumſcribed, the remaining Difference will be yet leſs than that of the former, and I ſtill come nearer to the Circle; ſo that at laſt there will be no Difference at all from the Circle: For I can inſcribe and circumſcribe ſo often, that the whole and entire Difference from the Circle will be leſs than any imaginable Area or Space in the World, as *Archimedes* has evidently proved.



This Part of the Mathematicks begins after that which I have explain'd; now as I have not only diſcourſed of right Lines, but have hinted to you ſomewhat of curvilineal Figures, and that theſe are either plain or gibbous, you muſt know that plain Figures cannot be meaſured, if you do not do it with exacteſt Nicety: If there could be Inſcriptions and Circumſcriptions *in infinitum*, the Difference *in infinitum* would be very ſmall, and this is the Quadrature of Curvilineals.

We come now to diſcourſe of *Gibbous* Figures. Conceive then with me a cylindrical Body *E*, which is formed of two Circles directly parallel, and placed directly one over another, if then there be drawn a right Line from the Superficies of one to the other, and that Line be turned about, there will ariſe a Superficies, which being circumſcribed is call'd a Cylinder, that is a corporeal Figure which includes Space; for a plain Circle does not include Space. *Archimedes* conſider'd that Figure which is circumſcribed and inſcribed in a Circle as a quadrate or Square; a Body therefore which is inſcribed in a Cylinder has four Square or quadrate Sides: But if in a Circle there is inſcribed and circumſcribed a Triangle, then we have *Priſms*; in this Caſe one Superficies is leſs than the *gibbous* Part, the other greater: If then I proceed *in Infinitum*, they will be equal to the *gibbous* Figure; and thus is this Figure *gibbous*, as being a Superficies compoſed of infinite right Lines. Every curvilineal Figure therefore is reduced to a Square; and this is to be ſeen in a Sphere. If I roll about a Semicircle, I deſcribe a Sphere; if I will reduce its Superficies to Meaſure, I circumſcribe a Cube, and inſcribe a Cube; if now I circumſcribe and inſcribe *ad Infinitum*, they will at laſt be equal; ſo that the Art of Meaſuring conſiſts in reducing plain Figures to right Lines, and in reducing *gibbous* Figures to plain ones.

VIII. Whoever attentively conſiders this will ſee that the Meaſure of Space is required to meaſure Bodies, the Meaſure of Squares to meaſure Superficies, and the Meaſure of right Lines muſt be found out to meaſure Squares.

Meaſure is a known Magnitude, to which other unknown Magnitudes are apply'd to know how many times the known Meaſure is contained. Every Meaſure ought to be ſimple and certain; the moſt ſimple Superficies therefore muſt be meaſured to meaſure a Body, and to do this is requir'd the known Meaſure of a Line: It is therefore requiſite that Geometricians know,

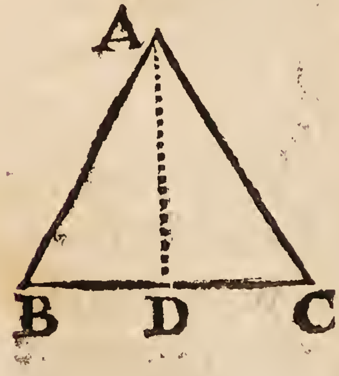
1. *The Meaſure of a Line.*
2. *The Meaſure of a Triangle.*

Upon which Account it is abſolutely neceſſary that he learn that Part of the Mathematicks call'd *Trigonometry.*

But you ought to ſtudy *Trigonometry* next after you have peruſed thoſe Treatiſes I mention'd above: He who knows how to meaſure a Triangle, knows how to meaſure all Things; let us propoſe, for Example, a Circle, when I know what Magnitude its Circumference has, I can make a Triangle equal to it. No one can ſearch into the Nature of the Powers of a Body, unleſs he knows this; for all we know of corporeal Powers muſt be computed from their Size or Magnitude. All Trigonometry ought from three Things given to find out the reſt.

IX. *Trigonometry* conſiſts in this, that from three Things given in a Triangle, all other Things are found out and diſcover'd.

In a whole Triangle I can conſider three different Things, *viz.* three Lines, three Angles, and the comprehended Space which is call'd the Area; now from three of theſe ſeven being given, the reſt are found out by Geometry; if you give three Sides, then from *Euclid*, *lib.* 1. *Prop.* 22, I know how to find out a Perpendicular on the Baſis; if therefore this be known, I know that if the Baſis *B. C.* be multiplied in Height, or by the Perpendicular *A. D.* then there reſults a Paralellegram double to the Triangle: Therefore half of the Product is the



the Area of the Triangle. By the Tables of Sines find out Angles.

If you give me two Sides and one Angle, I know immediately one Angle, and by the Tables of Sines I know the other two.

But from three Angles given I know nothing, becauſe three Angles of a Triangle are only two Rectangles; but if you give me three Angles and one Side, I preſently know the reſt.

This moſt noble and excellent Art was found out by the Geometricians, as well as theſe uſeful Articles following, *viz.* that there is a Proportion between the Magnitude of the Side and Angle, and this is demonſtrated in *Euclid*, *lib.* 1. *Prop.* 18. In every Triangle the greater Angle is that which is appoſite to the greater Side, the leſſer to the leſſer, *Prop.* 19. In like manner the greater Side is appoſite to the greater Angle, and the leſſer to the leſſer, *Prop.* 21, *&c.* For from the known Proportion of the Angles you gain an excellent Knowledge of Proportion between the Sides, and this by the Treatiſes of Sines, Tangents, and Secants.

X. If you would be thoroughly acquainted with this, read *Philip Lansberg*, *De Geometriâ Triangulorum*, *lib.* 4. in *Quarto*;

the *Amſterdam* Edition, 1631, is the beſt.

But if you would ſee all this treated more at large, read the practical Geometry of *Andrew Taquet* in *Fol.* printed at *Antwerp*, 1669, or the Tables of Sines and Tangents put out by *Adrian Vlacq*, reviſed by *Francis a Schoten*, the beſt Edition is that printed at *Dort*, 1664.

Theſe Authors will inſtruct you herein in a plain and eaſy Method, and without Circumlocutions, but no one more faithfully than *Taquet*; but to underſtand them you muſt firſt of all know *Euclid's* Elements, and the VII and VIII Paragraphs of this Chapter, this is abſolutely neceſſary.

From what has been ſaid, it follows, that a Geometrician is he who conſiders,

1. *The* Magnitude *of Figures.*
2. *Their* Encreaſe.
3. *Their* Decreaſe.
4. *Their* Diviſion.
5. *Their* Multiplication.
6. *Their* Proportion: And,
7. *Their* Tranſmutation, *and has learn'd to meaſure all theſe by Geometry and Trigonometry.*

XI. From the foregoing Principles is known the Meaſure of all Spaces, Plains, Superficies, Rectilineals or Curvilineals, which may be referr'd to right Lines; as alſo of all *gibbous* or hollow Spaces whatſoever which may be reduced to Plains, and even of all Bodies comprehended in theſe Superficies.

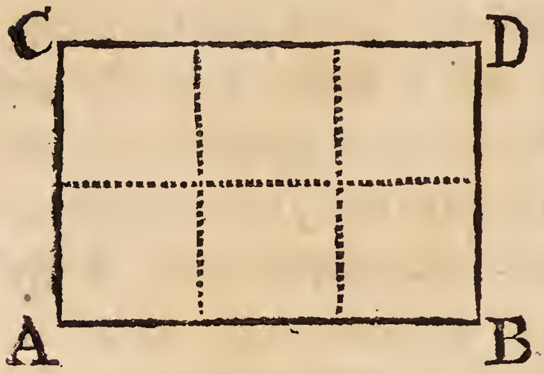
This is moſt evidently true, for *Euclid* has ſhewn how right Lines, and *Archimedes* how crooked and gibbous or hollow Lines may be meaſured. He therefore who ſtudies after this Method may be aſſur'd he knows the Fundamentals of Natural Philoſophy; for all theſe conſiſt in the Meaſure of,

1. *A right Line.*
2. *A Square.*
3. *A Triangle*: And,
4. *A Cube.*

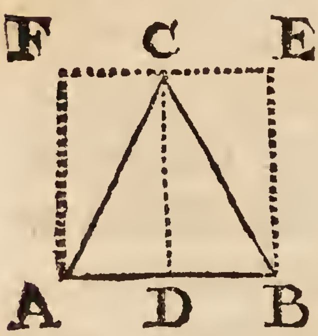
1. And firſt, a right Line is meaſured when the moving Longitude by which it is to be moved is meaſured; and therefore Geometricians make uſe of two Sticks and a meaſured Iron Chain, leſt the Elaſticity of the Chain ſhould change the Meaſure; its Longitude therefore or Diſtance between the two Sticks being

known, the Longitude of the Thing to be meaſured is likewiſe known.

2. Is the meaſuring of a *Square*; for all Meaſure of a Space is done by a Square; for Example, I have a Space *A.B.C.D.* and I would know its Magnitude; let the Parts of Longitude *A.B.* be multiplied by the Latitude *B.D.* there will reſult an entire Square equal to ſo many Squares therein contained; for Example, ſuppoſe the Side of the Space of the Rectangle *A.B.* be three Inches, and *B.D.* two Inches, the whole Space *A.B.C.D.* will be ſix Square Inches; and when we ſay the Area of ſuch a Thing contains, for Example, a hundred Inches, the Meaning is ſo many ſquare Inches.



3. All things are meaſured by Triangles; for Example, let the Line *A. B.* be the Baſis, and C. *A.* C. *B.* the Sides drawn from the Perpendicular C. *D.* upon the Baſis, if then *A. B.* be multiplied by C. D. it makes a Square or Rectangle *A. B. E. F.* One half of which is the Area of the Triangle (*Euclid. lib.* 1. *Prop.* 41.) or if we multiply the Number of Perpendiculars by the Number of



of the Baſis, and take away half the Sum or Product.

4. By a *Cube* are meaſured all real Spaces or Bodies themſelves. A *Cube* is a Body terminated by ſix equal Superficies, and is the moſt plain and ſimple of any relating to Bodies that can be thought of in the Mathematicks. Suppoſe any Line whatever given, upon which let there be deſcrib'd a Square, over which let there be ſet up other Squares, that Body which theſe Squares comprehend is a *Cube.* All Meaſure treated by Geometricians is made by a Body which has ſix equal Squares, one Side of which Body is the Foot in the meaſuring Line; if therefore I meaſure a Body, one Line of which is 20 Feet, and another 20 Feet, by multiplying theſe I have an Area of 400 ſquare Feet; then let the Height be multiplied by this, and then I have 8000 Feet, and therefore that whole Body has 8000 cubical Feet; for if I could have ſo many ſeparate Feet in that Body, I could preciſely apply them.

Hence you ſee to underſtand Meaſure well how neceſſary 'tis for you to have a true Definition of what is a right Line, Square, Triangle, and Cube.

Of all theſe, if any one deſires to ſee a larger and more accurate Account (and which Part of Geometry is call'd *Stereometria*, Meaſure of Solids or ςωμετρία) let him conſult *Andrew Taquet*, in his practical Geometry in *Folio* printed at *Antwerp* 1669, mentioned above in the foregoing Paragraph. Let us now come to the Mutation of Bodies.

CHAP. II.

Of Motion.

I. HE who knows the general Attributes of a conſider'd Body, by Degrees may ſoon underſtand all Changes or Mutations poſſible to a Body.

If at once you think upon a Body, as long as that Idea remains ſo long the ſame Body remains which ſhews that its Nature is immutable.

Hence occur two Things worthy our Obſervation ;

1. *The Eſſence of Things which can never be changed.*
2. *Thoſe things which are conceived, as they obtain in any thing when that Thing is conceiv'd with another ; for Example,*

Example, if I conceive a Sphere, and conceive it in æternum, *whatever I deduce from thence, yet the Sphere and its Proprieties will ſtill remain immutable,* viz. *that it is a round Body,* &c.

Hence it follows that a Thing never can be conceived mutable if it be conceived alone; now a poſſible Mutation ariſes from the Conjunction of Things, and when that is really ſeparated it is call'd accidental; for if I conceive a Sphere preſently after its being changed, I do not in ſuch Caſe conceive only the Nature of a Sphere, and all the aforeſaid Proprieties, but alſo I think on ſomewhat that was not in it before, namely Mutation, which I did not conceive in it before: Now if I conceive a Sphere in Motion, (ſince all Ideas are immutable) I conceive it in Motion *in Infinitum*, as long as no other Body changes its Determination; but if it be conceived that Motion carries it on to affect any other Body, it is conceived to act either with a greater, leſſer, or with the ſame Motion, and therefore Motion depends on other Bodies.

II. That Body we call one whoſe Parts in ſuch Manner cohere as that Motion given to one Part may move the whole Moles, but not ſeparate the touched Part from the untouched.

We ought to define what a Body is, for in this matter Naturaliſts run into the greateſt Confuſion, for every the leaſt and moſt minute Particle of an Atom conſiſts of others more minute; ſhall we therefore conclude an Atom one Body, when that can be again divided? This Matter therefore I have thoroughly conſider'd, and can find no other Definition but what I have given; for every Body whoſe Parts ſo cohere that they may transfer Motion to the whole Moles is one Body, which is comprehended in one Superficies, tho' it conſiſts of various Bodies. Unity therefore conſiſts in this, that is, that the Parts cohere in ſuch manner as I have here laid down.

If it be requir'd then what are many Bodies: I anſwer, thoſe which mutually embracing each other, do not transfer Motion when given from one Part to another, but ſeparate the touched from the untouched Part.

III. In every Body conceived as one there can be conceived no Mutation, unleſs the whole Place, or Figure, or Unity be changed. If I conceive that Body to be changed as to place, the ſame Figure and Quantity may remain notwithſtanding; its Unity therefore remains, and it is one Body, tho' exiſting one while here, and another while there. It is therefore moved and changes Place.

And the Figure of a Body may be changed tho' the Body keep its ſame Place; for Example, a Piece of Wax may receive new Forms by Impreſſion of our Fingers, the ſame Quantity ſtill remaining. One Body may be made many, that is, if its Unity be diſſolved, and it be divided into various Figures, and this is called *Diviſion.*

IV. Every one therefore ought to ſtudy the Knowledge of Motion in that whole Body in which it is conſider'd; if a whole Body be transferr'd by a Motion impreſs'd on one Part, ſuch a Coheſion in the Parts is requir'd as may not be deſtroyed by a Force affecting one Part.

V. It is requiſite too that the whole Strength of Motion be communicated to the whole Body in one Moment; for if this is not done, one Part will be moved in the firſt Moment, and another Part not, which is againſt the Hypotheſis. One only whole Body therefore receives Motion in one only Moment.

VI. It is likewiſe requiſite the whole Strength or Power of Motion be equally diſtributed to the whole Bulk or Moles of ſuch Body.

Suppoſe a Body divided into 100 Parts, and by the Motion of one Degree I ſtrike one Part, it is abſolutely neceſſary that that quantity of Motion be diſtributed through all the 100 Parts, and that too at the ſame Moment; for if this Body in one Moment ſhould receive half as much more, it would be ſeparated; every one of the other Parts therefore would have *99* Degrees of Motion: If this was not ſo, one Part of the ſame Body would move faſter, and another ſlower, and then it would not remain the ſame Body; this therefore is the impenetrable Power of Nature, that Motion proportionably be diſtributed to the whole Body.

VII. Such a Body continues to be moved by ſuch an inherent Motion.

VIII. Such Motion goes on *in infinitum*, if a Body be conceived as alone and excluding others.

IX. And always by a right Line produced by the firſt begun Motion. Since every Body is moved in a Moment it makes a right Line, and the ſame Cauſe remaining it neceſſarily produces an imperfected right Line, and that at equal Times.

X. Nor is any thing changed in that Body, but only Site or Exiſtence in ſeveral Places and at equal Times it will produce the ſame Spaces with the ſame Proportion.

XI. If a Motion be given to one Part of one Body, and that Part by ſuch Motion gives way from the others not affected by it, then the whole or Moles remains quiet, or is moved more ſlowly, or is retrograde.

It is very pleaſant to conſider how many Mutations of Motion a Body may undergo, and this chiefly is the Object of Phyſicks or natural Philoſophy. In the foregoing Part I have treated of the Mutations or Changes of Figure, but now I ſhall diſcourſe of all the Fundamentals of Mechanicks, which are to be underſtood from Separation of Parts. All Mutation is cauſed by Motion.

XII. Every untouched Part therefore requires a *ſiſtent* or *retropellent* Cauſe, or at leaſt greater than abſolute Reſt or Quiet.

This is the moſt profound *Theorem* in all Natural Philoſophy or Phyſicks; for if I conſider this one Body, and the Parts of this Body to be ſeparated by Motion into two Bodies, then in the very Inſtant in which the impellent Cauſe gives its Impulſe it muſt ceaſe to be one; if by a ſudden Communication of Motion theſe Parts are moved all together, then they are only one Body; wherefore at the ſame Moment that this Unity is deſtroyed, *this* Part muſt of neceſſity ſeparate it ſelf from *that*. Now *Coheſion* is greater than abſolute Quiet, and is the Cauſe that hinders Seceſſion or Separation of Parts.

I ſay *Coheſion* muſt be greater than Quiet, for if Bodies conjoined did only reſt themſelves, there would be no Difficulty to ſeparate them, but hence it follows that they would not be one Body; there can therefore be no Separation of Parts, ſo as to make the Motion more violent if the Body cohere: Suppoſe a Body abſolutely one, of Wax for Example, and no Medium of Air or any other Body elſe exiſting: If then any Power ſhould be forced upon this Wax, the Parts would not be mutually ſeparated from each other, but would be deſtroyed at once, becauſe abſolute Quiet is leſs than Coheſion, and all Motion ſeparates while it impels on one Part, and is reſiſted on the other: If it were not ſo the Body would be deſtroyed; for Example, if you conceive a compacted Body, and indifferent either to Motion or Quiet, ſo ſoon as Motion ſhall impel or ſtrike one Part, the Body will be deſtroyed, but if on the other Part there be a Reſiſtance, it is ſeparated by this Motion. Hence we ſee that Separation requires two Cauſes, *viz.*

1. *Reſiſtance.*
2. *Motion.*

XIII. The greater the Force is with which theſe two Cauſes oppoſe each other, ſo much the more violent is the Separation of Parts, that is, the Deſtruction of the whole follows: So that to cauſe Separation, of Neceſſity there is required an impellent Cauſe on one Part, and a reſiſting Cauſe on the other, and the greater this Impreſſion is, the ſooner will the Body be ſeparated; for the moſt violent Motion only impels or enforces a Body; there muſt therefore be the other Cauſe likewiſe preſent, *viz.* Reſiſtance, or there will be no Separation. For Example, you have a Mind to break a Stick; to do this it is not neceſſary only that the Stick receives ſome Motion, but the oppoſite Part muſt be moved by your other Hand, which may ſerve as the other moving Cauſe. Oppoſition therefore in different Parts may very well be, and then Separation becomes more eaſy.

I have now told you all the Separations of Motion; for every Separation of Motion is always local in reſpect of a Body to be moved: Now beſides mutation of Place and Unity there is a third Species, and that is, when the ſame Body remaining, its Figure is changed.

XIV. If the Figure of a Body be changed, and the whole corporeal Moles remain one, then ſome Parts will be ſeparated from their former Place, and yet they will cohere to the whole.

Suppoſe I have a Piece of Wax of one Pound Weight, having the Figure of a Parallellogram, tho' I do not ſo much as touch it with my Finger, yet its Superficies will be changed, the ſame Weight remaining: That a Body therefore remain one it is required that the whole Moles remain one, and the Parts not recede mutually from each other; but now in this Caſe that ſame Body is changed, becauſe the Parts are inwardly tranſpoſed tho' they cohere.

XV. Part therefore of the old Coheſion remained, or after Separation a new one obtained. Suppoſe we conceive a Body weighing one Pound Weight, and of a Paralellogram Figure; ſuppoſe this Figure be changed, remaining the whole Moles, this Change or Mutation may be effected two Ways, firſt, if it now has, or begins to have another Figure, it will ſtill weigh one Pound, but yet the Parts are tranſpoſed: Therefore in this Caſe ſome Parts remain coherent, and others are changed. The ſecond Way is, if in the very Inſtant that one Part is ſeparated, it immediately joins it ſelf to another; for if it be very tenacious it will give way by reaſon of the applied Motion, but by reaſon of its Viſcouſneſs will apply it ſelf to a reſiſting Part. Theſe are the two ways Mutation can be effected, and never any yet could be imagined more juſt.

XVI. If the firſt Cauſe obtains, ſuch Body is called *flexible*, its Parts being ſo diſpoſed, that they are changed in Figure by a given Motion, and yet remain in Coheſion.

XVII. If this *Flexibility* be tenacious of the Site of an impreſſed Figure, it is call'd *Softneſs*.

XVIII. But if a Figure ſo changed by Flexibility (the Cauſe of Flexibility ceaſing) returns to its former Site and Figure, ſuch Body ſo affected, is called an *Elaſtick* Body.

This is the Idea of Bodies which change their Figure; for either a Body is moved by one projective Motion, or its Parts are abſolutely ſeparated, or are ſeparated ſo as to cohere and remain, and is either a ſoft Body, or if they return back immediately to their former Figure, it is an *Elaſtick* Body. If you take Wax and impreſs on it any Figure whatſoever, that Impreſſion remains, becauſe Wax is a ſoft Body; but if you bend a thin Piece of Steel, it will fly back again into its former ſtate, and this reſilient Power is called *Elaſticity*.

XIX. All Motion therefore in every thing in Nature is cauſed by theſe three Things, *viz.*

1. *Gravity.*
2. *By another impellent Body.*
3. *By attractick Power.*

A Body which is once one, remains one *in æternum* if conceived alone; but if you conceive this Body to be deſtroyed, and there was a Paſſage hence to the Centre of the Earth, it would move thither of its own accord. This is called,

1. *Gravity* from the Power of Motion, or the *vis Centripeta*; but take away Gravity of Bodies, and conceive, if you can, how one Body can impel or inforce another.

2. This is called *local Motion impreſs'd*.

3. There are alſo *corporeal Powers*, by means of which one Body comes to another; for Example, put a Loadſtone to Iron, it will draw the Iron to it, and this Power is called *Attraction* or *Motion from Powers puſhing on each other.*

I have now ſhewn you all what may be conſider'd in relation to the Fundamentals of Change or Mutation.

CHAP. III.

Containing all the Parts of Mechanicks.

SECT. I.

The Firſt Part of Mechanicks.

MECHANICKS is the Supputation of the Quantity of Motion which is given or taken away by Cauſes [See laſt Paragraph of the preceding *Chapter*] propoſed by one to another Body; or it is the Calculation or Deſcription of Motion of Quantity which arrives from one Body to another by *Gravity*, or *local Motion*, or *attractick Powers*: For every Mutation is only Tranſpoſition of a Figure, or Acception of Motion, or its Amiſſion or Direction, and this is the Object of Mechanicks; if, for Example, ſuch a Body meets ſuch a Body, we learn from Mechanicks how they are moved after this

Acceſſion or meeting together: And ſince this happens in all Bodies, you will eaſily ſee the Neceſſity of Mechanicks.

II. That Faculty preſent or inherent to a Body, in order to give or take away Motion from another, is call'd the Force or *Power* of that Body.

III. And therefore moſt certainly every Power is either reſiſting or impelling the reſiſting Power. Sir *Iſaac Newton* calls the unacting Power *vis Inertiæ*, and the other Power he calls Motion communicating Force. *Motus communicans Impetum.* After knowing the Nature of Powers, either reſiſtent or impellent, take a Piece of Marble of ten cubical Feet, let it hang quietly by a Cord in a perfect *Equilibrium*; let another Piece of one cubical Foot ſtrike againſt it, the one will reſt, and the other will move, or rather they will both move; in their very Contact therefore they make a Maſs of eleven Feet, and then it is moved with ſo much the leſs Velocity the greater the Maſs is in which Motion is diſtributed: Therefore preciſely it changes, as well as it is changed by another; the recipient Cauſe therefore of Force, as much Motion as it receives from the moving Body, ſo much preciſely it takes from it. Hence you ſee that this Axiom is very true, *viz. Action and Reaction always act equally upon each other.* If I break an Egg by whatever Force or Power, and all that Force is taken from me, and not deſtroyed by me, but by the reſiſtance of the Egg, it takes therefore from me ſo great a Quantity of Power; and thus a Body changes and is changed. And this is the Foundation of all Calculation in Mechanicks, *viz.* active and paſſive Mutations. Mechanicks do not make a new Motion, but apply a new Motion; for otherwiſe Motion of the entire whole would be encreaſed *in Infinitum*, which is impoſſible.

IV. That therefore the Relation between the impellent and reſiſting Powers may be found out, it is only neceſſary that theſe ſix Things following be demonſtrated in Order:

1. The Action of a moved Body perfectly hard, directly impelling a quieſcent Body perfectly hard. Suppoſe two Bodies both perfectly hard, and one merely reſts or reſiſts, and the other moves, then I ought, having given the Magnitude and Power of the moved Body, to calculate the Velocity and Power by which the moved Body ſtrikes againſt the quieſcent Body.

2. Ought to be known the Action of a moved Body perfectly hard on a Body perfectly hard moved directly againſt it, that is, when two Bodies perfectly hard are moved towards the ſame Point, and meet one another, with what Power they mutually act againſt each other.

3. I ought to know the Action of a Body perfectly hard moved on another moved Body perfectly hard preceding in the ſame right Line.

4. Muſt be known the Action of a Body perfectly hard, ſtriking obliquely on another Body perfectly hard, but quieſcent. Bodies are ſaid to ſtrike each other in a ſtrait Line, when the Line which joins the Centre of Gravity of two Bodies paſſes through them by their Contact, and are ſaid to ſtrike each other obliquely, when the Line, by Contact communicated to them both, does not paſs through their Centre, but thro' one Side or Plain.

5. Ought to be underſtood the Action of a moved Body perfectly hard on another moved Body perfectly hard, moving obliquely on the ſame Plain: And,

6. Ought to be known the Action of a moved Body perfectly hard on a moved Body perfectly hard moving obliquely towards its oppoſite.

Whoever from the Mathematicks has learn'd Calculation, may eaſily ſuppute or reckon the Mutations of Motion that poſſibly can be in any of theſe Bodies, and conſequently all the Laws of Motion.

V. If any one would ſee theſe ſix very exactly and compendiouſly demonſtrated, let him read *Wallis*'s Treatiſe of Percuſſion, [*Tractatus de Percuſſione*,] *pag.* 668, printed at *London*, 1670, in *Quarto*; this Treatiſe explains theſe ſix Proprieties: Or let him read the Philoſophical Tranſactions, [*Acta Philoſophorum*,] printed at *London*, No. 403, which have only Concluſions, not Demonſtrations: Or *Keil*'s Introduction to true Phyſicks. [*Introductio ad veram Phyſicam*:] But *Wallis* treats theſe much better than any one. We muſt confeſs the *Engliſh* were the firſt that diſtinctly fixed theſe Matters; tho' *Galileus* merits alſo our Praiſe for his Diſcoveries, but he wrote very confuſedly.

You have now a Method how to learn the firſt Part of Mechanicks, which is Calculation or Supputation of the Quantity of Motion given or loſt in a Body perfectly hard, not endued with any Elaſtick Power.

SECT.

SECT. II.

The Second Part of Mechanicks.

I. THESE foregoing ſix Proprieties are likewiſe to be found and demonſtrated in Bodies perfectly Elaſtick.

1. The firſt Part of Mechanicks treats of Bodies perfectly hard.

2. The ſecond conſiders the Laws of Nature in Bodies perfectly Elaſtick, wherein theſe ſix Proprieties occur.

In this many a very learned Man has err'd, and particularly *Deſcartes*, who, after he had a Mind to ſet up new Phyſicks in relation to the Laws of Motion, conſider'd Bodies perfectly hard, and ſeeing what were the Sequels of terreſtrial Bodies, concluded Motion did not deſtroy Motion: Now, I ſay, Bodies perfectly hard impelling each other of a perfectly equal Motion, will reſt in the Point of Contact; and then the Motion of both is deſtroy'd; [But *Deſcartes* ſaid they would fly back; for ſeeing this true in Phyſical Bodies, not Elaſtick, he would likewiſe apply it to Mechanicks,] becauſe they are equally preſs'd upon the oppoſite or contrary Parts, neither of them therefore will prevail but reſt; but in Phyſicks, while Bodies meet one another, and mutually preſs each other, they are mutually repelled; the Cauſe then of this Repulſe is in Motion, by which Bodies return to their former Site or Poſition.

Deſcartes ſaid Motion did not oppoſe Motion, but Direction Direction; and therefore Bodies perfectly hard meeting each other in the ſame Degree of Swiftneſs, would return whence they came: For if (ſays he) Bodies perfectly hard meeting one another with an equal Quantity of Motion ſhould reſt in the Moment of Contact, then if the Quantity of both their Motions was two Degrees, in this Caſe there would be entirely deſtroyed four Degrees of Motion; and then ſince the whole conſiſts of an Infinity of ſmall (and therefore perfectly ſolid) Atoms, it follows, that from their Concourſe a perfect reſt of them all muſt obtain; and tho' the Motion in them at firſt was impreſſed, they would ſoon loſe it, at leaſt the greateſt Part, 'till moſt of the Atoms come together, by whoſe Coheſion or Elaſticity the other Part of Motion remaining in the whole ſhould at length be perceived.

But this has ſince been diſcover'd and demonſtrated by ſeveral great Men, and what is wonderful, three ſeveral Perſons by different Arguments have agreed in the ſame Concluſion. The Royal Society of *England* in the Year 1662, would have all Mathemathematicians ſtudy to find out and diſcover the Laws of Mutation ariſing from the Colliſion of Bodies, which three Fellows of the Society, *viz.* Sir *Chriſtopher Wren*, *Hugens*, and *Wallis*, after they had apart reflected well on this Matter, diſcovered by pendulous Bodies: The Method was this, they hung up Bodies of an equal Magnitude by a Line, and then took down the Longitude of their Aſcent and Deſcent, by applying for this End another pendulous Body; then they folded up their Concluſions in Paper, and ſeal'd them ſeverally; afterwards when the Society open'd theſe three Packets, they found they all contained the ſame Concluſion. *Vide Acta Philoſophorum*, No. 43, but the Diſcovery and Demonſtration of this Matter is ſet down by *Wallis*, pag. 686 in the Treatiſe above, wherein is ſhewn the Reaſon of theſe Effects: You may ſee the ſame *in Tractatu* Hugenii *de Percuſſione*, in his *Poſthumous Works* which are ſold at *Leyden* by *Bondeſtein.* If you would ſee how Sir *Chriſtopher Wren* demonſtrated it, peruſe *Keil*, pag. 169, but above all *Wallis*, you may read him thro' in a few Days.

What has been ſaid will ſuffice for the ſecond Part of *Mechanicks*, *viz.* The Calculation of the Powers of Bodies perfectly Elaſtick.

SECT. III.

The third Part of Mechanicks.

HAVING been well inſtructed in the foregoing Matters, let our Student learn the Laws or Powers of heavy Bodies, in thoſe that are perfectly hard and ~~im~~perfectly Elaſtick. If you would ſtudy theſe after the cleareſt manner, conſult *Galileus de Motu locali ex gravitate Corporum.* This is a Treatiſe of the fineſt and moſt profound Speculation; this Book is printed at *Lyons* and *Piſa.* This Author firſt found out the Method of conſidering Swiftneſs and one right Line, and Gravity and another, and of theſe two made a Triangle. On the ſame Subject you may read *Alphonſus Borellus de vi Percuſſionis.* He was Scholar to *Torricellius*, who had *Galileus* for his Maſter. This Author unlock'd all the *Arcana* of *Galileus*, who having put ſome Weights into one Scale of a Balance, and obſerving that a very little Body falling ſuddenly, and with a great Velocity into the other Scale that was empty, moved a great Weight in the oppoſite Scale, ſaid he could not underſtand it; but *Borellus* very ingeniouſly diſcover'd that a quieſcent Body does not act, but at the very Moment it begins to be mov'd there isi n the other Body a much

per-
lastic

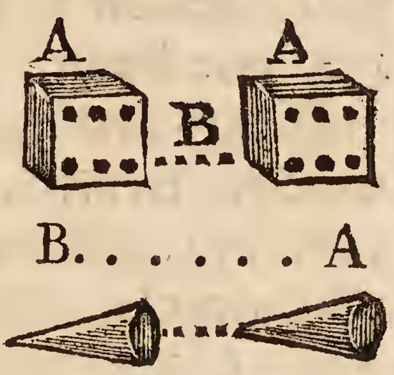
much greater Action than the Action of that which was quieſcent, and thus ſolved the Difficulty of *Galileus*. This alſo may be ſeen in the Mechanicks of *Wallis* in *Quarto*, *pag.* 33, and in *Keil*, *pag.* 232.

SECT. IV.

The fourth Part of Mechanicks.

AFTER the foregoing Studies muſt be learn'd how uſeful may be the Figure of an Inſtrument or Body communicating Motion to another Body to which ſuch Motions is communicated.

What Figure does, is thus explained: Take a cubical Body *A.* let it be moved along upon the Line *B.* and ſtrike directly on the reſiſting *Obex* or Bar, and have a determinate Force; if it weighs one Pound, and its Velocity be known, it will touch the *Obex* with its whole Side, and therefore will apply Motion to as many different Parts of the *Obex* as it touches: If now it be of the ſame Magnitude, and have the ſame Velocity, it will have the ſame Motion. If you ſuppoſe the Figure of this



Inſtrument or Body to be conical as in the Figures mark'd *B A*, it will then in its ſtriking on the *Obex* inhere, and the whole quantity of Motion will be impreſſed on one Point of the *Obex*; and therefore one Point of the *Obex* receives that Motion which in a cubical Body was diſtributed into ſeveral Points: This latter Inſtrument is therefore fitter and more apt to deſtroy the *Obex* than the former which communicates Motion to many Parts, becauſe ſo much greater is the ſlowneſs of Motion in every one of thoſe Parts.

Theſe Obſervations are moſt uſeful in ſolid as well as fluid Bodies; and hence it follows that Motion is not encreaſed, but that Motion is from ſeveral Parts receiv'd into one Point.

If any one has a Mind to ſee this more exactly treated, let him conſult *Wallis*, *pag.* 572, where he treats of Wedges in Mechanicks: *Deſcartes* in his Treatiſe *De la loy Mechanique*, and all Writers who have written of Wedges, but chiefly *Borellus*.

SECT. V.

The fifth Part of Mechanicks.

Hydroſtaticks.

IN the next Place muſt be learned that Part of the Mathematicks which conſiders the general Proprieties of all *Fluids*; and this is call'd from the *Greek* Word [υδϱοϛατικὴ.] *Hydroſtaticks.*

A *Fluid* is that Congeries or Collection of Bodies whoſe inſenſible Parts cohere with no Connection, or what is very eaſy to be changed. By this you ſee that in a Fluid the ultimate conſtituent Bodies which cohere by a ſmall Connection become one again; and ſo all that I have demonſtrated in general in relation to the Proprieties of one Body is evident here; but inaſmuch as theſe Parts are joined together, their reſpective Magnitudes, Figure, and various Degrees of Connection are therefore to be conſider'd, upon which depends the very Nature of a Fluid. The other Part which I now conſider has relation to the Proprieties which are in a particular manner proper to a Fluid as ſuch, for a Fluid has Parts either leſs or more cohering. A thick Fluid is that which has one Part greater than another. A viſcuous Fluid is that which has Parts that cohere with a cloſer and ſtricter Connection than in another Fluid.

Mathematicians conſider Bodies under theſe three Reſpects, *viz.*

1. *As Things moſt minute.*
2. *As having no Connection with each other:* And,

3. *As they are heavy.*

Hydroſtaticks is abſolutely neceſſary for a Phyſician; (for all things that happen in a Fluid are found in our Bodies)that he may thence know what is Life, Increaſe, Decreaſe; and how the ſpiritous and weaker Parts act by Vegetables and the Air.

II. That this Part may be the eaſier learn'd, theſe ancient Authors following are to be carefully read, *viz. Archimedes de his quæ humidis inſunt.* This Treatiſe is reviſed and amended by *Barrow*, and printed at *London*, 1675. This Subject is likewiſe excellently handled by *Stevin*, heretofore Mathematical Profeſſor, and chief Architect at *Lyons*, in his Treatiſe of *Hydroſtaticks*; his Works are in two Volumes in *Fol.* entituled, *Hypomnemata Mathematica vel Hydroſtatica.* Read alſo *Wallis de Hydroſtat. Mechanicorum*, pag. 708, printed at *London* in *Quarto*, in the Year 1670. *Jo. Alphonſus Borellius de vi Percuſſionis*, the beſt Edition is that of *Bologna*, but it is very ſcarce. *Vander Aa* likewiſe printed it. Mr. *Boyle* has given us many curious Experiments, as may be ſeen in his Book of *Hydroſtatick Paradoxes.* By peruſing of theſe you will very well underſtand this in a few Days time. *Borellus*, *Boyle*, and *Wallis* will merit your higheſt Praiſe; tho' by reading only *Wallis*, you may be ſufficiently inſtructed without a Maſter.

SECT. VI.

The ſixth Part of Mechanicks is, Hydraulicks.

I. IT remains now that we ſearch into thoſe different Rules or Methods of Motion by which fluid Bodies act or ſuffer as they are encloſed, or moved thro' Pipes, or Conduits and Elaſtick Veſſels, and this Part is from the *Greek* Word [ὑδραυλικὴ] called *Hydraulicks*, which ſignifies nothing elſe. A Phyſician therefore is to ſtudy this Part with all the ſerious Application of a Mathematician: For if any Part of the Mathematicks comes near the Nature of Medicine or Phyſick it is this, whether you conſider *Maſtication*, or *Digeſtion*, or *Circulation*, *Secretion*, or *Excretion*. He that would learn this Part muſt firſt be well acquainted with *Hydroſtaticks*, and likewiſe ought to know from *Mechanicks*, how a Body acts when impelled againſt the reſiſting *Obex* or Bar: For *Hydraulicks* ſuppoſes Liquors to be moved againſt the

Sides of reſiſting Veſſels as againſt their *Obex*. He likewiſe ought to know their ſeveral Figures and Rules of Inclination; for if ſuch a Fluid runs in ſuch Channels ſo inclined, we thence find out what Reactions and Changes it will undergo.

II. That the Knowledge of this Part may the more eaſily be acquired muſt be read that great Hero of Antiquity, who wrote *de Spiritualibus Pneumaticorum*. This Book is written in *Greek*, in which is explain'd the Structure of artificial Fountains, and on that Occaſion the ſeveral Ways of Water paſſing thro' Pipes.

Then the great and famous *Torricellius* ~~de~~ *Tubo Torrecelliano*, he was the Diſciple and Succeſſor of *Galileus*.

Benedictus Caſtelli, Diſciple of *Torricellius*; this Treatiſe is extremely ſcarce, but admirable on this Subject, *viz*. of the Motion of Water; it is written in *Italian* in *Quarto*: It demonſtrates what the Parts of Rivers ſuffer from Caſcades or Falls of Water, and what effect Water produces in running in Length, Breadth and Depth, and againſt any reſiſting Power or *Obex*; all which may be transferr'd to the Circulation of our Humours.

To this Part alſo Monſieur *l'Abbe Mariotte* is a noble Ornament: He wrote a Treaa Treatiſe in *French*, call'd *Experimens Hydroſtatiques* in *Octavo*, wherein he ſets down many wonderful Experiments which he made by throwing Water through ſeveral ſorts of Pipes; as alſo the Force of the Impreſſion of Water through Tubes by Peſtles, *&c.* but he is not eaſily comprehended unleſs by the experienced.

But you muſt not forget *Borellus de vi Percuſſionis.*

SECT. VII.

The ſeventh and laſt Part of Mechanicks.

L*ASTLY*, That Part of Mathematical Science which conſiders the Action and Retardation of a known Solid, moved by a known Fluid, is very uſeful for a Phyſician.

This is the moſt noble and ſecret Science that can be ſtudied by Human Wit, and which is almoſt neglected by all, tho' the moſt uſeful and neceſſary. The beſt and almoſt the only one that has treated of this Subject is Sir *Iſaac Newton* in his moſt excellent Book of Philoſophical Principles, *Part 3d.* wherein he conſiders what a Body may ſuffer in one known Degree of Motion by a Fluid, and then diſcover'd four

Degrees of Reſiſtance: If then a Body ſhould be moved by two known Degrees, it does not in ſuch Caſe find only eight times a greater Reſiſtance, but almoſt an infinite; and thence he explained the Actions of all known Bodies. I could wiſh this Book had been ſo publiſhed as every one might underſtand it.

Hugens in his Treatiſe of Gravity, Refraction and Light, has ſome *Theorems* on this Subject.

This Study is the firſt and principal Preliminary to that of Phyſick, and whoever is herein well inſtructed, will underſtand all philoſophical Books relating to Phyſick or Medicine that have been hitherto publiſhed, and whatſoever is known in the Theory, and what is deduced by Reaſoning and Argument.

In this Part we owe a great deal to *Borellus*, *Bellinus*, *Pitcairne*, *Malphigius*. Every Phyſician then ought to be well inſtructed in theſe Principles, before he proceed to that of Medicine or Phyſick; and theſe Sentiments of mine are agreeable to thoſe of *Hippocrates*, who in a Letter to his Son recommends Arithmetick and Geometry.

PART III.

CHAP. I.

Phyſicks or Natural Philoſophy.

I. PHYSICKS, or Natural Philoſophy, is the *Knowledge* of corporeal Things exiſting *in the viſible World.* This Science the Ancients univerſally called φυσικὴν, tho' not very properly, ſince Metaphyſicks and Pneumaticks treat likewiſe of Things natural.

It is the *Knowledge* of all Modes by which the Ideas of all Things can be repreſented ſo as the Mind may perceive them: I alſo ſay in the *viſible World*; for we will not with *Anaxagoras* diſpute of the Exiſtence of many other Worlds, ſince that belongs to the Philoſopher, not the Phyſician.

II. This Science is acquired partly by Obſervation of the Senſes, and partly by reaſoning, deducing from ſuch Obſervations Things not yet known by the Senſes.

III. The obſerving Part of Phyſicks orderly collected is called Natural Hiſtory, which is an orderly digeſted Collection of all Things which may be obſerv'd by the Senſes in corporeal Subſtances, *viz.* Aſtronomical, Animal, Vegetable, Mineral, *&c.* and he who deſcribes theſe thus obſerved is an Hiſtorian.

IV. This deſcribes all Actions exerciſed between Bodies, inaſmuch as they may accurately be obſerved in all Circumſtances by Help of the external Senſes.

V. The other Part of Phyſicks (for there are two Obſervations, and Concluſions thence deduced by Argument) which a Phyſician ought to learn from the Obſervations of Things firſt known, by thoſe Things which we have ſeen, (as mentioned in the ſeveral Paragraphs of the two foregoing Parts of this Book) conveys that to our Knowledge which our Senſes can no way diſcover, and yet obtain in natural Things. It is a known Truth that our

Senſes are only apt to diſcover ſome certain *Phænomena* in corporeal Subſtances, and that nevertheleſs there are infinite Things in Nature they can by no means ſearch out: For which Reaſon,

1. *Things that have been obſerved we take* pro datis.
2. *We take for Principles thoſe that are mathematically ſo:* And,
3. *By applying theſe Mathematical Rules to obſerved* Phænomena, *we draw our Concluſions.*

Theſe conduce to the Knowledge of thoſe Things which are not obvious to the Senſes, though they exiſt in Nature; and therefore let

1. *All* Phænomena *be obſerved.*
2. *One Obſervation be compared with another, whether they agree or diſagree.*
3. *By applying to them theſe Mathematical Rules are drawn Concluſions, which are moſt certain like Mathematical Truths, though they cannot be comprehended by the Senſes.*

You ſee here the Plan which a Philoſopher ought to follow, that he may acquire the accurate Knowledge of Things natural;

ral; and now I will lead you through all Phyſicks, and tell you both the beſt and moſt approved Authors as well as Experiments.

VI. That the firſt Part [mentioned in the fourth Paragraph of this *Chapter*] may moſt exactly be learn'd, *Ariſtotle* deſerves chiefly to be read in all his Works, which is call'd the Hiſtory of Phyſicks; that great Philoſopher the moſt eminent of the Ancients, who knew much more than the Moderns would have him to know: He, I ſay, who was the Great Preceptor of *Alexander* the Great, in his ſeveral Journeys through various Countries collected a vaſt Treaſure of Experiments in relation to Animals, Minerals, Meteors, Plants, and a great many other Things worthy to be known, *viz.* of the Generation of Animals and their Nature, *&c.*

Then read *Pliny*'s Natural Hiſtory; this Author, after *Ariſtotle*, is the only one left us of Antiquity capable of inſtructing us in what the Ancients knew in relation to Phyſicks. He made Collections from a thouſand Authors; and tho' they are intermixed with many Fables, there is nevertheleſs an *Index* of thoſe Things the Ancients knew in Medicine, Meteors, Aſtronomy, Botany, Chymiſtry, *&c.* for he has moſt elegantly extracted the very Marrow out of all Authors, not by Argument, or deducing Concluſions, but barely by Collection: He therefore muſt be read with great Caution, for he has a great many Trifles, and what is even repugnant to himſelf. He treats of Herbs better than any Botaniſt ſince; and therefore you may much better learn their Virtues from him than any other whomſoever.

The Text or Stile of *Ariſtotle* and *Pliny* is better than that of their Commentators. I know only theſe two amongſt the Ancients that are valuable; thoſe who have commented upon them, as well *Greeks* as *Arabians*, are ſcarce worthy a Place in your Study, ſo wretchedly have they explain'd them. *Pliny*'s Edition put out with ſo much Induſtry and Care by *Delecampius*, Profeſſor of Phyſick, is by far the beſt.

VII. By Antiquity I mean 'till the ſixteenth Century, and this Age excell'd all the preceding, which is chiefly owing to the moſt Illuſtrious *Francis Bacon*, Lord of *Verulam*: For in Reality before his Time the Learned World was wholly taken up with the Trifles of the Peripatetick Philoſophy, and Commentators of the Schools who had by their Quiddities render'd Phyſicks merely Logical.

At that Time came up the Chymiſts, who were the firſt Authors of Experimental Hiſtory, whoſe Knowledge in relation to the Cauſes of Things the Lord of *Verulam* ſuſpecting, before the End of that Century roſe up in the Reign of Queen *Elizabeth*; and this great Man only certainly deſerved this Honour, that he alone made greater Progreſs in Phyſicks than all that ever went before him, or ſucceeded him. The beſt Edition of his Works is in *Folio*, printed at *Frankfort*, 1665, tho' his *Engliſh* Epiſtles are not there.

His Character was this: He had ſo ſprightly a Genius that he could not be deceived or impoſed upon; for never Man was endued with a Genius ſo penetrating into Phyſicks; he was of an unparallell'd Diligence and Induſtry; for while he was Lord-Keeper of the Seals and Chancellor of *England* (which Offices he admirably well diſcharged,) he wrote all his Works, which are deſervedly divided into two Parts; the firſt conſiders *Morals* or *Ethics*, and the ſecond is purely Philoſophical: Without preſuppoſing any thing he lays down in a plain and ſimple Style what occurs in Things corporeal; and from theſe Premiſſes concluded that all *Phænomena* and Experiments agreed in ſuch or ſuch a Thing; and therefore that in which they agreed muſt be the *Ratio Cauſæ*, or Matter of this or that Thing, or what ought to be therein chiefly conſider'd; and thus he reduced to one Head all what was ſo to be reduced, as you may ſee by reading his Treatiſe *De Ventis & Calore*. I can aſſure you that in no Author you will find greater Science, Prudence, and Candor than in him, who far excell'd all *Europeans*, and even the *Engliſh* themſelves, and has all that is good of *Deſcartes*.

VIII. Next to the Lord of *Verulam* (and who trod cloſe in his Steps) ſucceeded the Illuſtrious *Boyle* likewiſe an *Engliſhman*, and as great a Glory to *England*; what that Lord began, this Nobleman endeavoured to perfect. Conſider the Times, and read whatever Authors you pleaſe before *Bacon*, and compare their Writings with his, and you will find him to have carried away the Prize from them all. And as *Boyle* was moſt diligent in his Searches, ſo there is ſcarce any Part of Phyſicks that he has not taken Notice of; for if you have a Mind to know what is done at the very Bottom of the Sea, you have nothing elſe to do but to read his *Opera ſub-aquatica*; and you will find as you read other Authors, that this has out-done them all in his Way; for he ſearched with the utmoſt Diligence into the Nature of Fire, Air, Water, Earth, Salt, Oil, Foſſils, *&c.* by making Experiments of them all. His Works are put out ſeparately, as the Time would permit: Some are to be ſeen in the *Philoſophical Tranſactions* of *England*, but not all; his whole Works are printed at *Geneva* in *Latin*, but the Tranſlation is in ſome Places extremely obſcure, whereas the *Engliſh* is admirably clear and plain; the beſt *Engliſh* Editions are thoſe of *London* and *Oxford.*

In acquiring the Knowledge of corporeal natural Things, theſe two excellent Perſons muſt be conſulted Night and Day: But as *Boyle* kept no Order, you muſt make an *Index* your ſelves: But *Bacon* ſtrictly obſerv'd Order.

The other Authors who have written ſince, I ſhall tell you as briefly as I can.

IX. At the Time *Boyle* began to publiſh his Book of *Natural Philoſophy*, (excited by the Death of *Bacon*) was inſtituted the *Royal Society* of *London* compoſed of Members from all Parts of *England*; and this Society was erected on Purpoſe to ſearch into the Secrets of Nature. Much about the ſame Time the ſame Work was inſtituted and carried on in *Germany*, *France* and *Italy*; that is, there was to be taken into this Society Men of the greateſt Ingenuity and Candor, who ſhould treat of the Affections and Diſpoſitions of Things natural with the higheſt Circumſpection and Caution, not ſpeculatively by Reaſonings or Argument, but by Experiments. The firſt who began this were the *French* in their Book *Journal des Sçavans* printed at *Paris* in the Year 1665, which they continue on to this very Day, by adding to every Month what has been written or diſcover'd thro' all *Europe*. In theſe Books are contained all Experiments as well private as publick, and all new Diſcoveries. From which, if there was carefully collected all what relates to Phyſicks, Chymiſtry, Mathematicks and Medicine, it would make a Work moſt excellent and noble. But as they now lie, a Student by reaſon of their being crowded with variety of Matter and many a uſeleſs Subject, would be frightened from reading them. But however, it would be of Advantage to you, if you had an *Index* after every Treatiſe, which you might turn over and mark down the uſeful Places without troubling your ſelves about the other. When I recommend this Work, I recommend at the ſame time thoſe Authors that they cite, for to give you every one here would be a Work of infinite Labour.

X. At the ſame time the *Engliſh* by publiſhing ſeveral Books, began to communicate to the World in a regular Method all what they had diſcourſed of in their private Conferences. Which being Experiments made according to the Lord of *Verulam*'s Plan, you may eaſily gueſs what a prodigious Work that was: For they were *Wallis*, *Newton*, and the greateſt Mathematicians, Naturaliſts, Phyſicians, and Chymiſts, who collected theſe Experiments which are contained in the *Philoſophical Tranſactions*, a Work begun in the Year 1665, and continued to the Year 1708; and (what is much to be lamented) are now left off. They were printed in *Engliſh* in a great many Volumes in *Quarto*. *Oldenburg* a *German* tranſlated the firſt Years into *Latin* in *Quarto*, but thoſe Writers who follow'd him, through want of Diligence tranſlated nothing. The *French* have cull'd out ſeveral of theſe Experiments and put them into their Journals. Theſe *Philoſophical Tranſactions* are vaſt Vol. but in the Year 1705, three Vol. in *Quarto* were put out in *Engliſh* by way of *Compendium* or Abridgment by *Lewthorp*, a very eminent and experienced Phyſician, who reduced with the greateſt Exactneſs thoſe vaſt Diſcoveries under ſeveral Heads or Chapters, omitting none that are uſeful, and that ſo clearly, as evidently gave the World a ſufficient Specimen of his excellent Genius: But we muſt deſpair of ever ſeeing them appear in *Latin*, unleſs that Author himſelf would ſo far oblige the World. This is truly the ſecond Baſis or Foundation of Experimental Phyſicks.

XI. Then in the Year 1667, there was publiſhed at *Florence* in *Tuſcany* an *Italian* Book in *Folio*, entituled, *The Hiſtory of all the Experiments made in the Univerſity of* Cementina.

It is a Book printed at the Royal Preſs, and treats of the Rules and Methods of the Society which the Grand Duke founded and ſo much encouraged by his Example, that he was generally preſent at their Experiments and Conferences. It is a Work not tranſlated, but you have many Things contained in it (by way of Abridgment) in the *French* Journals of the Year 1668. There is likewiſe a Book put out in *Italian*, called *Giornale di Litterati*, by *Signor Abbate Roſati*, in which you have ſome curious Things not elſewhere to be met with, I mean many Experiments made in *Italy*.

XII. Afterwards in the Year 1670, there

was ſet up a Society in *Germany*, compoſed of learned Perſons from all Parts of *Europe* under certain Rules and Statutes, by the Name of the *Leopold* Society, or of the curious Inquirers into Nature, [*Leopoldinæ Societatis, vel Naturæ Curioſorum*] who then began to publiſh Treatiſes of all Things relating to Phyſicks and Medicine; and it was order'd by the Rules of the Society, that whatever Curioſity or Rarity ſhould be diſcovered ſhould be deſcribed in Writing, and ſent to one certain Place. This Book appears under the Title of *Curious Miſcellanies* [*Miſcellanea Curioſa*,] printed at *Leypſick*, and is continued on to the Year 1707 or 1708; there you have every thing that was done in *London* and *France*, &c. but as there are diſplay'd in thoſe Tracts a great many Beauties, ſo are there likewiſe of Trifles not a few.

XIII. After this Work came out the Hiſtory of the Academy of *Paris*, written and publiſhed by *John Baptiſt Du Hamel* in *Quarto*, which begins from the Year 1665, and ends in the firſt Edition (which is the beſt) at the Year 1699. Nothing can be finer than this Work; for it contains all the Diſcoveries which the King of *France* made choice of, and which he himſelf call'd by the Name of *The Academy of Sciences*,

ences, [*Academie des Sciences*,] and there you have all what is new relating to Natural Philoſophy.

XIV. Then follows the *Acta Leypſienſia*; and theſe began in the Year 1682; every Year there came out a thick Volume in *Quarto*, and by continuing it on for a whole Year, the Authors in every Volume took in what was moſt uſeful and advantagious, and the principal and neweſt Experiments which the moſt learned Men all over the World communicated to them as they found out and diſcover'd in Medicine, Mathematicks, &c. Hence we have wherewith to congratulate our Studies on account of new Diſcoveries, leading us by an eaſy Way into the inmoſt Receſſes of Nature, and which we owe to all the Authors of theſe Books.

XV. But laſt of all is publiſhed a Book which far exceeds them all, and that is the Hiſtory of the Royal Academy of Sciences [*Hiſtoire de l'Accademie des Sciences*.] They who know how to frame any Judgment of Study, know very well that there is no Society ſo famous and ſo uſeful as what *Lewis* the Fourteenth inſtituted, after having invited thereto the greateſt Men of the World; as *Hugens*, *Caſſini*,

Caſſini, *De la Hire*, *Moralde*, *Newton* with honourable Titles, giving them Penſions, and allowing them Time and Place to make their Collections, and communicate them to the Publick. There was an Edict put out, that at the End of every Year ſhould be publiſhed a Work which was to be well conſider'd and examin'd by the whole Society. From hence we have the beſt and nobleſt Treaſure of Phyſicks; for the Volumes beginning in the Year 1*699*, contain every thing relating to the Mathematicks, Aſtronomy, Phyſicks, and Medicine, and conſequently all Things a Phyſician ought to know; which Books, if you can once obtain, you will have the beſt and nobleſt Library in the World.

XVI. Here you have a Liſt of the Authors I recommend to you to buy, and who will inform you of all true Experiments, and theſe only will be uſeful for you to read. For he that is reſolved to read Authors will learn what is falſe as well as what is true, and will find not only the Opinions, but chimerical Notions of ſeveral Authors which can only be diſtinguiſhed by thoſe who have made a conſiderable Progreſs in Learning.

XVII. Beſides thoſe I have named, there

are ſome Authors who do not write in a Philoſophical Style, but deliver down Hiſtories of natural Things as *Ulyſſes Aldrovandus* in thirteen Volumes in *Folio.* This learned *Italian* who expended all his Subſtance in Travelling, making Experiments, in correcting Authors, and collecting rare Curioſities, ſet up a *Muſæum* which is now kept at *Bologna*, and is called after his Name, *Muſæum Adrovandi*, to whom alſo the Prince uſed to ſend his Curioſities; but (what is much to be lamented) he was reduced at laſt to extream Poverty. He wrote the Hiſtory of all thoſe Animals, four-footed Beaſts, Fiſhes, Foſſils, Herbs, *&c.* which he had collected in his own *Muſæum*; but becauſe he gave Credit to ſome Authors, he has ſome Things very fabulous.

XVIII. After him follows *Conradus Geſnerus*, a Man that was a very Prodigy in Learning, and whoſe Writings I cannot read but with Wonder! He was a Pillar in Medicinal Science, he wrote of Animals, Fiſhes, Plants not before deſcribed; as alſo a great many Experiments of his own: In whatever Works of his you buy you may depend upon it you will have a glorious Treaſure, written with the ſublimeſt Judgment, intermixed with nothing fabulous;

lous; his Works, as many as they are, are all ſingle and ſeparate.

XIX. Another famous Author is *Andreas Cæſalpinus*: His Works are admirable, whatſoever of them you can buy; he was a conſummate Botaniſt, and was the firſt that reduced the various Species of Plants to their *Genus*, through a curious Obſervation of their reſpective Productions. *Moriſon* borrowed from him, tho' he ſuppreſſed his Name. He wrote alſo admirably well of Metals, and was the firſt that found out the Circulation of the Blood.

XX. Add to theſe *Morinus*, otherwiſe call'd Father *Merſenne*, who wrote a Book in *Quarto* of Mechanical, Hydroſtatick, and aereal Experiments, which Volume is almoſt ineſtimable; for it contains whatever *Galileus* wrote, or *Torricellius* in his Epiſtles; this Father held Correſpondence with all the Learned of his Time, he praiſed every body and was devoted to no Party; but this made him at laſt be ſuſpected on both ſides, and made him want many Friends at the latter End of his Life, his Book is entituled, *Experimenta Phyſic. Mechan.* printed at *Paris*.

I have now given you a Liſt of the principal Authors who excel in Natural Hiſtory, and in them you will find laid down whatſoever you may draw any uſeful Concluſion from; and as you read theſe and compare them with others, you will find that no Authors in the World have written better, or with more Learning and Exactneſs than theſe.

XXI. From theſe Authors (for it muſt be confeſſed they have written every thing diffuſedly and without Order, as the Subjects offered themſelves to them in their Journals,) you muſt collect Experiments, reduce them to their Claſſes, and place them under their proper Titles, and keep them as a Natural Hiſtory. This Method I my ſelf made uſe of by ſimply reading and noting down in the Books whatever was written reſpectively relating to Anatomy, Phyſick, Chymiſtry, *&c.* Then I had a Book mark'd *A* for Example, in which I wrote down every thing that related to Phyſicks; in another mark'd *B*, what belong'd to Anatomy; and in another *C*, what related to Chymiſtry, and ſo on; and then I reduced all to different Heads or Chapters; to one Head I reduc'd what ought to be reduced to that one Head; and by this Means I had compiled a *Theſaurus* in three Vol. (and ſo may any one in Time) which is of ineſtimable Value: And this will be in the higheſt Degree advantagious to you in your Studies; for when you have taken your Doctor's Degree, you will not have always Time to turn over Books, but to have recourſe to your *Index*, in which you may find what you want by a ſlight Peruſal.

XXII. Phyſicks or Natural Philoſophy is divided into four Parts.

1. *Aſtronomical.*
2. *Elemental.*
3. *Chymical*: And,
4. *Phyſical Qualities of all Kinds.*

Whatever Phyſical Changes I find out, inaſmuch as they depend upon the Sun, Moon, *&c.* I reduce to *Aſtronomy.* But what, ſay you, has a Phyſician to do with Aſtronomy? Read thoſe Authors, not ancient but modern, who have treated of Influences, and you will be ſatisfied.

To the the *Elemental* Part I reduce every thing that relates to Fire, Air, Water and Earth.

To *Chymiſtry* all that I ſhall preſently ſpeak of in the enſuing Chapter: And,

To *Phyſical Qualities*, I ſhall reduce every thing relating to Heat, Smells, Taſts, and all ſenſible Quality.

XXIII. The other Part of Phyſicks which reſults from Reaſoning has likewiſe its Authors; for entire Phyſicks, as I have before obſerved, conſiſts of two Parts. The Object of the firſt is in making Experiments, and the other conſiſts in drawing Concluſions by Argument and Reaſoning from thoſe Experiments. It requires indeed the greateſt Prudence and utmoſt Skill to recommend thoſe Authors who have written and reaſoned not only faithfully but in a good Method and Order; for Men very ſeldom err in Experiments, but very often are quite wide of the Mark in their Arguments and Speculations; and in Reality I ought to look over my Authors a much longer Time than I have done before I recommend them to you; but theſe I have reduced to a few, *viz.*

1. Whatever *Galileus* wrote on this Part of Phyſicks is very good, for what the Ancients wrote is worth nothing. But this Author was the firſt that began to draw Concluſions by Mechanicks from Experiments, and his Arguments have ſtood Examination.

2. *Torricellius*, whoſe Works are extremely ſcarce, followed the Steps of his Maſter.

3. *Benedictus Caſtelli* has reaſoned with

the utmoſt Exactneſs in his Treatiſe of Motion.

4. *Bellini*, who has ſet us an Example how we might argue from Phyſical Principles.

5. *Alphonſus Borellus*, and you may place him before all the former; but (what is to be lamented) he too much indulged himſelf in Arguments purely Chymical.

6. *L'Abbè Mariotte* in all his Treatiſes, eſpecially his *Eſſays de Phyſiques*.

7. *Perault* in all his Works, and in his *Eſſays de Phyſique*.

8. D'*Amontons*, Fellow of the Royal Society at *Paris*.

9. *De la Hire in Naturæ Phænomenis*.

10. *Hugens* in all the Treatiſes he publiſhed *De Pendulorum Motu*.

11. The Prince and Captain of all is Sir *Iſaac Newton*, who knows as much as all the reſt of Mankind together, as all his Works will inform us, and which only have ſet Bounds and Limits to the Wit of Man. An Example of this we have in his firſt Volume in the Chapter of Opticks and Colours. I never ſaw a Book where were ſtronger Arguments drawn from Experiments: It is the beſt Pattern in the World, and deſerves the higheſt Honour.

I have now given you the Advice a young

Phyſician ſtands moſt in need of purely as he conſiders a Body in general. For you have ſeen here in Abridgment what Things are neceſſary to be known before a Man undertakes the Study of Phyſick or Medicine; *Viz.* The Mathematicks and Experimental Natural Philoſophy; and therefore what follows belongs to it, *viz.* Chymiſtry, which is in the higheſt Degree neceſſary in making Experiments.

CHAP. II.

Chymiſtry.

I. AFTER you have gone thro' all the foregoing Studies, the next Science you ought to apply your ſelf to is Chymiſtry; for this Science ſhews you the Method of ſearching into the Nature of Corporeal Things, as well in Phyſicks as in Medicine.

II. For Chymiſtry is the joining together, or ſeparating certain Bodies by violent Motions, directed at firſt by Fire, which Element gives us thereby an Opportunity of thoroughly conſidering and obſerving what are joined and what ſeparated

parated from each other, and confining thoſe that are changed to Veſſels: Now as Phyſicks totally conſiſt in a plain and ſimple Obſervation of Experiments, no one can doubt but that it is abſolutely neceſſary for a Phyſician perfectly to know what Bodies are, and their ſingular Effects, and of what they are compounded.

III. This Science in the firſt Place ſhews what are the Powers of every ſingle Body, upon which chiefly depend all corporeal Actions, which can never be known but by Experiments.

Chymiſtry therefore does thoſe Things which Mathematicks and Phyſicks could not do; for the former only gives us a general Idea of Bodies, and a Method of finding out thoſe Affections or Attributes which are common to all Bodies. Phyſicks makes what Obſervations it can by the Senſes; but Chymiſtry teaches us the particular Diſpoſitions and Inclinations of Bodies which operate by that which is not common, but peculiar to them; hence it plainly appears how much greater an Advantage it is to a Phyſician to know Particulars than Generals; for tho' I may know the Mathematicks, yet that Knowledge does not any ways aſſiſt me in knowing the Powers of Arſenick, for Example; but if

I make any Experiments upon it by Chymiſtry, I can then be able to tell you its Powers, *viz.* that if it be taken inwardly it will inflame, corrode, *&c.* the Parts; upon which I endeavour to apply Remedies to this Diſtemper. That Art therefore that diſplays the Diſpoſitions of ſingle Bodies is certainly the beſt and moſt uſeful: For how can any one know there is any ſuch Body in Nature which has ſuch coherent Parts that they can ſcarce be ſeparated? By Speculation this can never be done, but by Experiments. For Example, put Oil of Vitriol to an *Acid*, or Oil of Tartar *per Deliquium* to a fixed *Alcali*; when theſe two Bodies are mixed together it will be impoſſible for you to know what they are compounded of or of what Nature by Argument or Reaſoning, but by Experience I know that theſe two Bodies mutually change in order to form a third Body which cannot be ſeparated by a great Fire, and this Inclination or Diſpoſition a Man can never find out but by Chymiſtry. Sir *Iſaac Newton* gives us many chymical Experiments of the Attraction of Bodies.

I know very well that if I inject it into any Body by a Syringe, it will deſtroy every Part it touches; but if I inject *vitriolized Tartar*, it will ſcarce do any Hurt at all. All this ſhews that there is ſomewhat in Bodies which a Mathematician or Naturaliſt as ſuch cannot obſerve; the Chymiſt only fore-ſees that ſuch Motions will follow, and new Actions be produced. And thus we ſee that the Nature of Waters, Oils, Spirits, Salts, Earths, can only be diſcovered by Chymiſtry; and you ſee what Uſe theſe Things are of, ſince they belong to the Action and Permanency of our Body.

IV. In the next place Chymiſtry teaches us how to excite thoſe corporeal Actions which a Philoſopher or Phyſician would exerciſe; for Example, ſuppoſe a Phyſician would excite in the Stomach a Motion as would mutually ſeparate from each other ſuch Liquids as it has received; or by which the Parts may be ſtimulated mutually to give way to each other and the circumjacent Parts: Unleſs he is a Chymiſt 'tis impoſſible for him to know this Action; for Example, ℞ ✠^{ti} *diſtillati* ℥ij *Sp.* ✱^{ci} ʒij. Let the Patient drink firſt one half, and then the Remainder ſome time after, and by this means the Parts will be moved up and down and ferment. Or ℞ ✠ *Communis* ʒi. and it will have the ſame Effect with Chalk.

Again, ſuppoſe a Phyſician would kindle a Fire, or make a Noiſe like Thunder in a Moment ℞. *Ol. Carioph.* ʒi. *& Duplum. Sp.* ⊖ni *rectificati*, and 'tis done in an Inſtant. But without the Knowledge of Chymiſtry it is impoſſible: And beſides,

V. Chymiſtry by Experiments makes us penetrate into Nature it ſelf, makes us know the Powers of what we eat and drink, our Humours, Medicines, and Poyſons, by ways unknown to other Arts.

VI. The Nature of Bodies is ſaid to be known when their Figure, Weight, Hardneſs, Porouſneſs and Solidity are explained, and all this Chymiſtry does while it tries to change Bodies; as alſo the Motions that follow, if ſome Bodies are applied to others, and how that is done. Thus, if it be asked what is Bread? No one but a Chymiſt knows that Meal by being reſolved into an Oil and by Fermentation, can be reduced into a Spirit; by this all its Powers are ſhewn, and by Putrefaction it becomes human Dung. Nor can any one know what are Humours but a Chymiſt, *viz.* that they have ſuch and ſuch Qualities or Inclinations, and have ſuch Parts when they are reſolved to cauſe theſe Operations on the Blood, and at laſt become Blood themſelves. And the ſame is true in relation to Medicaments and Poyſons. Let a Man take of ſublimate Mercury ʒi. nothing in this Caſe but Chymiſtry can help you; but a Chymiſt will tell you that ſublimate Mercury is an Acid which corrodes the Bowels; he therefore preſcribes you to take ⊖^{is} 🜿^{ri} ʒv. in a Pint of Water, and in an Inſtant there will be a Powder of a duſty Colour, *&c.* and only the Mercury will precipitate; for theſe Alcalis contain in them a corroſive Acid. If Arſenick was given, you will know by the ſame Method and way of reaſoning to take away alſo its pernicious Effects.

VII. That therefore a Man may eaſily, and in a ſhort Time learn this moſt noble and neceſſary Part, let him make himſelf acquainted with what is moſt general in Chymiſtry, that is, thoſe Things which are performed by the Uſe of Inſtruments, and their Object, and by the Operation of this and that Production.

VIII. Thoſe Authors who have treated of the Uſe of Chymical Inſtruments with the greateſt Clearneſs and Perſpicuity are theſe that follow, *viz.*

1. *Nicolas Le Fevre* in his Treatiſe printed at *Paris*

Paris in two Vol. 12mo and now reprinted at *Leyden* in 12mo in two Vol.

2. Father *Lemery* in his Courſe of Chymiſtry [*Cour de Chemie.*] The beſt Edition is that of *Leyden* in the Year 1697, ſold by *Bonteſtein*, and I believe it has been reprinted twenty Times, and has had every time Notes made upon it at *Paris* and new Additions.

3. *Chriſtopher Morley* in his excellent Treatiſe printed in *Quarto* at *Leyden.*

4. You have printed at *Amſterdam* in *Octavo Leydenſia Collectanea Chemica*, and ſeveral other curious Tracts: And,

5. *Conradus Barchauſen* will give you extreme Satisfaction in this Matter, it is a Book printed in *Quarto* at *Leyden*, and may be had at *Bonteſtein*'s.

IX. When a Chymiſt has maſter'd all theſe Authors, then he muſt read thoſe who by Experiments have illuſtrated this Art by adding always to it new Works and Diſcoveries: And,

1. The moſt eminent and Prince of all is Mr. *Boyle* in all his Works. There is not one Part of Chymiſtry that he did not excel in; it is great pity there is not made a general *Index* to his four Volumes printed in *Quarto*, in which might be contained every thing relating to Chymiſtry, Phyſicks,

&c. there is ſuch a one printed in *Engliſh* in *Octavo*, call'd *Boyle's Works abridg'd.*

2. To him may be added *Kungelius* a *German*, a moſt laborious and renowned Chymiſt, who ſpent many a Tun of Gold in making Experiments, and to find out the Philoſopher's Stone; he was maintained by the King of *Pruſſia*: His Works, which ſoever they are, are moſt excellent, and had he not been ſo intent upon the Philoſopher's Stone, he would have exceeded *Boyle*; he found out many a curious Experiment in Chymiſtry, but he neglected them on account of the Stone.

3. *Nehemiah Grew* of the *Royal Society* in *England* in all his Works as well Botanical as Chymical, he is an excellent Author.

4. Next to theſe is *Homberg*, he was maintained at the King's Expence, he relates his Experiments (which are many) in a clear Style, as may be ſeen in the Acts of the Academy of *Paris*: As alſo,

5. *Godfrey*, whoſe Experiments are moſt admirable, and theſe are chiefly thoſe who have been famous in Experiments; to whom may be added,

6. *Otho Tachenius*, whoſe Theory is not worth much, but his other Works moſt excellent; as alſo *Antony Nerius*, in his Art of Glaſs-making. [*De Arte Vitriaria.*]

8. *George Stachley.*

9. To all theſe muſt be added what you find in the Philoſophical Tranſactions of *London* and *Paris*; all theſe are very famous Authors.

X. After having gone through the two Claſſes of theſe principal Authors, Order obliges you to conſult thoſe who have ſo written of Chymiſtry as to amend ſome Part of Phyſick as much as Chymiſtry would permit; ſuch a one, for Example, was *Boyle*, who writ univerſally of Experiments, and conſequently belongs to the ſecond Claſs; he writ alſo of the Blood, which makes him belong to this third Claſs.

XI. For firſt in the Theory of Phyſick thoſe are moſt uſeful who have written of the Nature of the Blood, *viz.* its conſtituent Parts, Effects, *&c.* as they were diſcoverable by Chymical Experiments, and among theſe the principal are,

1. The famous *Boyle* in his Book call'd, *Apparatus ad Sanguinem humanum cum Appendice*, printed at *London* in *Octavo*, wherein the Author examines the Nature of the Blood according to Mechanicks, Phyſicks, and Hydroſtaticks; after that he examines Chymically into what Parts it may be reſolved, how theſe Parts act ſeparately, how

conjunctly; for a Chymiſt's Examination of the Blood differs very much from that of a Phyſician's. To this Claſs likewiſe belongs,

2. *Hierom Barbatus*, who has written a Treatiſe of the Blood and its *Serum*; this Book is printed at *Frankfort* in *Duodecimo*, in the Year 1687: As alſo,

3. *John Baptiſt Helmont*, who was the firſt that I know of who diſcover'd a great many Proprieties of the Blood, *viz.* That the fixed Salts of Vegetables in a human Body become volatile, ſo as to exhale thro' the Skin, and common Kitchen Salt in the Blood becomes likewiſe ſo volatile as to be expreſs'd by Sweat, and evacuated volatile by Urine. *Boyle* confirms the ſame Experiments.

4. *Otho Tachenius*, who writ three Treatiſes, the firſt is called *Hypocrates Chemicus*: The ſecond has almoſt the ſame Title, but is a Defence of the former Part againſt *Zwelfer*: The third *Morborum Princeps, ſive Tractatus de Podagra*. This laſt is much ſcarcer than the other two, and much better, as treating of the volatile Salts of Animals. You will ſcarce find any one that has explained better the Nature of Human Blood, Urine, *&c.* And to theſe may be added,

5. *John Laurence Bauſchius*, *De lapide Hæmatite & Ætite*; to which he prefixed

his *Tractatus Hæmatologicus* full of Chymical Experiments. It was printed at *Leipſick* in *Octavo* in the Year 1665; this Author was a *German.*

6. *Vieuſſens* writ a great Book on the ſame Subject, wherein he endeavours to demonſtrate that the Blood is acid in it ſelf, in which how much he was deceived all the World knows; but while he was defending with all his Might theſe Experiments, the World ſaw in that Defence many a noble Obſervation of the Analyſis of Human Blood on this Account. Alſo,

7. *Iſaac Holland* richly deſerves your Attention; I have this Author in *Folio* written in *Dutch*; he has a great many Experiments which later Authors arrogate to themſelves; this Treatiſe is call'd, *Of the Quinteſſence of Human Blood.*

XII. Of Urine and its Chymical Analyſis, the beſt whoever writ are,

1. *Boyle* in all his Works.

2. *Laurence Bellini* in his Treatiſe *de Urinis & Pulſibus.* Every one before him examined this Subject Chymically only; but this Author does it by the Diſpoſition of the aqueous Humour; by the various Degrees of Colour, Taſte, Thickneſs, as it contains more or leſs of Water: For which Reaſon before *Boyle* you ought to read,

3. *Willis* who treated all his Subjects Chymically; but the beſt Author of all is,

4. *John Baptiſt Helmont* in his Treatiſe, *De Lithiaſi*, or the Cauſe of the Stone, in which he Chymically reſolves freſh and putrified Urine both of Man and Brutes into their Principles, and reduces them to Medicinal Uſes; this is the beſt Treatiſe ever was publiſhed by *Helmont*.

5. *Iſaac Holland* knew all the Properties of Urine, even to the *Phoſphorus*.

XIII. The only Author upon Sweat is *Tachenius*, who tells us that he took ſome Lye in which Shirts had been waſhed, and diſtilled it by a gentle Fire, from whence roſe a Salt exactly like that of Urine (for the fixed Salts of Mens Bodies ſtick upon their Shirts:) But Lye gives no volatile Salt, and therefore ſuch Salt is produced from Sweat.

XIV. On the Bile are theſe three Authors following, *viz.*

1. *Silvius.*

2. *Bohnius* writ with greater Diligence and Fidelity. But the beſt Author on the Bile is

3. *Verheyn* in his ſecond Part of Anatomy, printed at *Bruſſels* in *Quarto* in the Year 1710.

XV. Of the other Humours I can recommend to you no Chymiſt that has treated of the Conſtitution of ſolid Parts.

CHAP. III.

Pharmacy.

THE beſt Authors that have written of *Pharmacy* are the Chymiſts.

Pharmacy is the Art of knowing how in due Time to gather, preſerve and prepare Medicines according to true Rule. *Chymiſtry* conduces very much to this Knowledge, as teaching thoſe Things which can be kept and which cannot, and at what Time they muſt be gather'd; that this Plant, for Example, has ſuch Qualities, or has not, and that from it ſuch or ſuch a Thing may be made or extracted: But how theſe Authors muſt be read in Order to your acquiring Knowledge in this Art, I ſhall diſtinctly ſhew you; but it muſt be obſerv'd that *Pharmacy* is divided into five Parts: Of all which in their Order.

PART I.

THE firſt Part conſiders the compounding Parts of Vegetables, and the Principles into which they are reſolved. Of Authors read theſe following, *viz.*

1. *Tournefort*, in that laborious and excellent Treatiſe *Des Plantes naiſſantes aux environs de* Paris printed at *Paris* in *Octavo*. I do not know any one has Chymically examined Plants more exactly than this Author; for he added their freſh Juices to ſeveral Salts, and thence ſaw their Effects, and what Redundancy of Salt there was in ſuch or ſuch an Herb; for Example, he tells us that the Juice of Roſes is aſtringent, is compounded of ſuch Salts and *Menſtrua*, gives ſuch a Colour, and then being mixed with the *Serum* and Blood has ſuch Effects. It is a Work of incredible Labour, and the beſt that ever was written on the Subject. Other Authors are not ſo valuable: The next to him are,

2. *Nehemiah Grew*.

3. *Boyle*.

4. *Robert de Du*, who alſo reduced Plants to their Principles.

5. *Dodart* writ upon this Subject; this Author was a glorious Member of the *Royal Society* at *Paris*; his Book is called *Hiſtoire des Plantes* in *Folio* and *Duodecimo*.

6. *Du Hamel* here and there in his Hiſtory of the *Royal Academy*; this Work was continued by *Bilſious* by the King's Command.

7. *Godfrey a Bolduc*, likewiſe a Member

of this Academy. If you would read Anthors that are free from Trifling, read only theſe; for they have admirably well reſolved Vegetables into their Principles, and this is the Foundation of true Pharmacy: Other Authors are not worth your Care.

PART II.

THE ſecond Part of Pharmacy teaches how to gather Plants, and what Time is proper for that Purpoſe.

Helmont ſays that in Winter time they abound with Salts and want Oils; that in Summer they emit Salts, and the Oils and the more fixed Salts concenter. If then you would have a Salt-Matter, let them be gathered when they begin to ſhoot from the Roots; but if you would have a Balſamick Matter, Oil, and Roſin, then gather them in *Autumn* or the beginning of Winter. And for this our *Chymical Inſtitutions* are very uſeful. I know of no Chymiſt that ever writ on this Subject; only the Galeniſts tell us that odoriferous Plants are oily, and that the Oils are excited by the Sun; theſe therefore are to be gathered in the Morning, and then may be kept; but unleſs they are rubbed they give no Oil.

PART III.

THE third Part of Pharmacy teaches us what Part of a Plant is to be gather'd, and at what Time; that Seeds contain much Oil, and leſs of Earth or Salt if they are gather'd when at their Maturity; that Rinds or Buds abound with Balſam in Winter time, which defends the Plant from nipping Colds, and they muſt be gathered in the Heat of Summer, [In this Part likewiſe there are no Authors.] that all Vegetables being often wet and dry'd loſe all the Principles they have; and therefore ſuch Plants are to be kept cold.

PART IV.

THE fourth Part contains the Method of preſerving and keeping Plants duly gather'd, or teaches us the beſt Manner of preſerving them; but this only can be learn'd from Chymiſtry, that is, what Plants are to be kept (as has been ſaid) in a cold Place.

PART V.

THE fifth Part teaches the Preparations of Medicines from a known

Matter. You muſt read theſe Authors following, who have written of preparing Simples Chymically; for no one ever div'd deeper into this than the Chymiſt. For in all Countries, now-a-days, Medicines are well known which a Phyſician may ſafely preſcribe and with good Succeſs: For Example, it is well known that Cinamon has ſuch Powers as excel every thing thought of by Antiquity: What Man could have a nobler Medicine againſt Pains in the Nerves than that aereal Spirit of Turpentine? One or two Drops of Oil of Fenel cures a Body labouring with Phlegm which could never be found out but by Chymiſtry; but if you would ſee how nobly perfect Chymiſtry is in theſe Things, you muſt read along with this our Method,

1. *Angelus Sala* (the moſt ſucceſsful Chymiſt in Practice that ever was) in his Treatiſe call'd *Opera Auguſta Chemica*, printed at *Franckfort* in *Quarto* in the Year 1647, who in deſcribing all his Secrets teaches us how to prepare Vegetables, Minerals, Animals, *&c.* He was an *Italian*, but liv'd there a long Time and there publiſhed his Works.

2. *John Schroder* in his *Pharmacopæia Chymica Medica*, printed at *Franckfort* in *Quarto* 1685; but this Book is printed at

Leyden in *Octavo* with a very copious *Index*. There never yet was a *Pharmacopæia* that teaches with greater Clearneſs, Exactneſs and Sincerity what are the Effects of prepared Medicines than this, his only Fault is, that he is too ſhort in his Deſcription of Simples, and writes not Syſtematically, but according to Pharmacy, and with the ſeverity of a Chymiſt.

3. *John Zwelfer* in his *Pharmacopæia Regia* printed in *Folio* at *Nuremberg* in the Year 1675, but he is not to be compar'd with *Schroder*, having collected and blended all Things together in a very indigeſted Manner; it is the beſt *Galenical Pharmacopæia*, but not what we make uſe of. Theſe two Authors are compleat in this Matter, and all others are obliged to them for what they have.

4. *Joſeph Quercetanus* in his *Pharmacopæia Dogmatica reſtituta & hermetica*, printed at *Paris* in *Quarto*, and afterwards in *Germany*. He has ſome Things in him which are not to be found elſewhere. This Author had a Mind to dive into the Secrets of *Paracelſus*; but the beſt of all by far and who can never ſufficiently be commended is,

5. *Daniel Ludovici* in his *Pharmacopæia Moderno ſeculo applicata* publiſhed in *Gothick-Saxon* in the Year 1685, in *Octavo*.

It is an Abridgment or Compendium of all Pharmacy; he conſider'd what various, coſtly, and laborious Forms of Preſcriptions our Age labour'd under, and therefore he had a Mind to collect only what was good and neceſſary. Perhaps you may think it was too bold an Undertaking ever to be perfected, but I don't think ten others could do what he has done; but it muſt be owned (and that is his only Fault) he writes in ſo obſcure and compacted a Style, that none but the Experienced can extricate themſelves out of ſuch various Opinions: But he that has Patience and underſtands Pharmacy and Chymiſtry will underſtand him. He examined all the Secrets of *Helmont*, *&c.* and really deſerves the Character of a juſt, ſevere, and moſt ingenuous Man.

By this time our Student is prepared to apply himſelf to his Study, being now inſtructed in the general Principles of the Mathematicks, Phyſicks, Natural Hiſtory, Chymiſtry and Pharmacy; and all theſe moſt certainly muſt be learn'd before he begins his Study of Phyſick; for our Method is not inſtituted only to make a Man preſcribe [*Recipe*] like common Phyſicians, but that he may know what is now known, and be inſtructed by Experiments, rational Deductions and Conſequences, *&c.*

CHAP. IV.

Materia Medica, and Botany.

I. THE firſt thing which a Man muſt learn is in Reality what is moſt remote from the Practice of Phyſick. The *Materia Medica* (eſpecially Botany) may be learn'd of any one that is not a Phyſician, as a Part of Natural Hiſtory. But how ſhall a Phyſician know how to preſcribe Medicines, if he does not know whence to collect them? This Study is moſt eaſy to thoſe that are willing, as requiring no great Judgment or ſevere Application.

II. After our young Student is ſufficiently inſtructed in the Knowledge of what has been hitherto ſaid, Order obliges him to apply himſelf to the learning thoſe Things which belong to the Knowledge of Simples, and whence the *Materia Medica* is deduced, and out of which are made all what we call by the Name of Medicines or Medicaments.

III. A Medicine is that which being apply'd to a ſick or healthly Body is capable or apt to prevent a future Diſtemper, or cure a preſent one: And Medicines are divided into Bodies which are apply'd or given inwardly to Bodies, and into thoſe that are ſpirituous which comfort the Mind through the external Senſes. But the former only are properly called Medicines. To cure is ſo to take away the Diſtemper, that what was either deſtroyed or corrupted by it may be entirely reſtored to its former Condition.

IV. The *Materia Medica* is therefore that which *Dioſcorides* call'd [ὕλη ἰάτρικη] *Sylva Medica*, and this is taken either *Phyſically* or *Medically*; if in the former Senſe, it is a Collecton of all thoſe Things which can be reduced into Medicines; if in the latter, it teaches the Art of knowing the ſeveral Parts, the Gathering, Preſervation, Preparation, and the whole Medical Hiſtory of all Simples.

If there be any thing, not prepared, but purely as Nature produces it, it is called a Simple. The *Materia Medica* is then divided into two Parts:

1. *The firſt conſiſts in the Deſcription and treating of Simples.*
2. *The ſecond in reſolving and compounding theſe by Art.*

1. The firſt teaches us, for Example, what ſort of a Body Antimony is, *viz.* that it is a Metallick Foſſil, by what Notes or Marks it may be known, to wit, by its leadiſh Colour, and that its Parts are furrowed or channelled like a Perſpective Glaſs, then from what Places it may be digged up, what Powers it has, and what Diſtemper it cures.

2. The ſecond tells us into what Parts it may be reſolved, *viz.* into Sulphur and Metal, and theſe again into other Things, and what may be made by compounding all theſe; it is called a ſimple natural Body, tho' by its Nature it is compounded of various Parts.

V. On this Subject of Simples have written ſeveral Authors neceſſary to be ſtudied, not only by young Beginners, but thoſe that are more advanced in their Studies. Some Authors have abridg'd all what is contained in voluminous Treatiſes into a narrow Compaſs, while others again have written ſo much at large as they ſeem not to have omitted the moſt minute Circumſtance of thoſe Subjects they have undertook to treat of; for Example the Bezoar Stone, which is its native Place, in what Part of the Animal, how it grows, *&c.* and have conſequently made an entire

Hiſtory of this very Particular. But as a Beginner would undoubtedly deſire firſt to read all this in Abridgment, I ſhall recommend to him theſe Authors following, *viz.*

1. Margrave'*s* *Materia Medica contracta* in *Quarto*, printed at *Leyden.* It is a Treatiſe ſo digeſted, that there are in it all Simples that are uſed to be preſcribed in *Europe*, with their reſpective Figures, Names, Uſes, Powers, and their whole Hiſtory; in ſhort, every thing which this Author uſed always to explain in his College.

2. *Schroder* in his *Pharmacopæia.* As to the Chymical Part of it, his Method is much to be commended. If you would read any Author who has extracted from other Authors the native Place of Simples, at what Time they are to be gather'd, what Marks to be known by, and what Virtues they have, and how to be kept, read *Schroder* along with *Margrave* for Simples; for whatever theſe Authors have of Common is very good. To theſe may be added,

3. The *Pharmacologia*, or *Manuductio ad Materiam Medicam* by *Samuel Dale*, printed at *London* in *Octavo*, in the Year 1693. It is likewiſe printed in other Places. In this Author you will find, in a very ſhort Style, what ought to be treated of, or what you can expect in relation to Simples, their

Marks, and Powers admirably reduced into their proper Claſſes; he has interſperſed ſome Things from the Ancients, but has very faithfully inſerted his Hiſtory of Simples under one Title, and in ſuch manner, that as ſoon as you ſee them at the Apothecary's, you will exactly know them. Theſe three Authors are ſufficient for a young Student.

VI. For thoſe who are more advanced, or if you would arrive to the greateſt Perfection in this Knowledge, you muſt read other Authors: As,

1. *Gabriel Fallopius* in three Volumes in *Folio*, (or by it ſelf in one Volume) it is call'd *Tractatus de Medicamentis & Medicinalibus in Dioſcoridis Librum.* The firſt Volume is full of Erudition; the ſecond is a Treatiſe of Bath Waters, [*De Aquis Thermalibus*,] in which you have whatever Simples are produced by Waters impregnated with the Embryos of Metals; and in the third he has written admirably well of Metals and Foſſils.

2. But if you would have a Work the moſt compleat of all in this kind, you muſt buy *Dioſcorides* with *Mathiolus*'s Notes of the Edition of *Gaſpar Bauhinus*; this Author was a Man very famous, and had a Penſion from the *Romans* for his extraordi-

nary Merits: He travell'd over all *Africa*, where he ſearched into all the Monuments of Phyſick, eſpecially the *Materia Medica*; after that he travelled over all *Aſia* and *Europe*, and collected what was in uſe among the Ancients in their Medicines made out of Simples, and not only reduced Simples to their proper Claſſes, but gave them their reſpective Characteriſtical Marks, their Smell and Taſte, and collected all the Learning of Antiquity in ſuch a Manner as you may eaſily diſtinguiſh the true from the falſe, and the good from the bad. This Author has Commentaries or Notes written upon him by *Mathiolus*, who was not ſo much a Botaniſt as that he could judge of the Figures of *Dioſcorides*; for which Reaſon a great many Errors and ſynonymous Words have crept into that Work, and as he was a Perſon of a moroſe Temper, and had been often corrected by ſeveral Perſons on this Subject; at laſt *Gaſpar Baukinus*, a moſt learned Botaniſt undertook that Task, corrected the Figures, and added a hundred new ones, and brought the Work to ſuch Perfection that it may very well paſs for the moſt perfect Treatiſe as well of Animals as Foſſils and Vegetables as ever came out. Add to theſe,

3. *Salmaſii Exercitationes Plinianæ in Solinum & C. Plinium*, printed at *Paris* in

three Vol. in *Folio*, in the Year 1629: In this Work are contained all the Experiments and Hiſtory of Antiquity, but there are likewiſe ſome Errors: For tho' *Salmaſius* was a very learned Man, yet he was no Botaniſt; and he wrote of Plants which perhaps he had never ſeen in all his Life. And,

4. *De re Fodinaria & Metallica* in *Folio* by *Agricola*; this Author is moſt excellent.

VII. To theſe Authors I muſt confeſs I am indebted for all what I know on this Subject, and they alone are ſufficient, if read in the Order as I have now placed them, and from theſe Fountains a Phyſician may draw what may be of greateſt Uſe to him in his Studies, and abridge it. For Example, ſuppoſe the Ancients have ſaid many things in relation to the Nature and Qualities of Wormwood; to know this, read *Markgrave* and *Schroder*, and there you will find that it is a ſhrubby Berry-bearing Plant of a greyiſh Colour, and of a moſt bitter Taſte, *&c.* But if you would ſee whether it be what *Plierius* preſcribed, then peruſe *Mathiolus* on *Dioſcorides* of *Bauhinus*'s Edition; and as he was very famous in the Hiſtory of the Ancients, he tells you how you may know the true *Ponticum* to which *Dioſcorides* attributed ſuch Virtues. After him read *Dale*, in which in a ſhort Method you will ſee what both the Ancients and Moderns have ſaid on this Subject, and as you are collecting one Part reduce under it all what belongs thereto. And this will be ſufficient.

VIII. But if beſides this general Knowledge of the *Materia Medica*, a Phyſician would perfectly be acquainted with Botany, let him at firſt chuſe a Maſter who may ſhew him *vivâ Voce*, and with his Finger the Names proper to every Plant; for he muſt not begin by mere Reading.

IX. A curious Study of this Matter is not required for the *Materia Medica*: For *Botany* is the Knowledge of all Plants in the World hitherto known: And it is no Matter of Moment whether a Phyſician, for Example, knows what an Oak is, provided he knows all thoſe Plants which are uſeful in his Study, which is limited to about two hundred Plants, and is the moſt eaſy of any, and may be conſider'd in theſe two Reſpects, *viz.*

1. *As enlarging Natural Hiſtory.*
2. *As it belongs to the Uſe of Phyſick, and the full Knowledge of that Science.*

X. For the Reaſon why Phyſicians now-a-days are ſo intent in this Study with ſuch unwearied Application (though ſuch an exact univerſal Knowledge does not any ways ſeem uſeful in order to attain their End) is becauſe *Hippocrates* (or ſome other of the Ancients) has deſcribed ſimple Plants with ſuch Virtues which Plants are unknown to us by thoſe Names. Thus if we would make a Collection of the Herbs of *Hippocrates*, we muſt not obtrude any for what ~~it is~~ not; for Example, we muſt not ſay this Wormwood is the *Abſinthium* of *Hippocrates*: For as there are a great many Species of Wormwood, we ought to be acquainted with them all before we can give a Judgment whether it be ſo or no, to remedy this Inconveniency the Reformers of the *Materia Medica* have diligently apply'd themſelves; amongſt whom the chief is *Fabius Col~~on~~na.* umna

y ari

XI. As ſoon as you have reſolved to learn the Nature and Qualities of Plants, you will find ſeveral Words which give you no manner of Notion of the Plants they are intended to ſignify; for Example, I hear the Name of *Aſclepios*, *Helenium*, *Parthenium*, &c. pronounced: Which Names form in the Memory no Idea of the Plants ſo called. But if the Plant with its Name be pointed out to me by the Finger, I have then a Foundation to remember its Name with ſuch Deſcriptions, and ſo retain it: But if you would have recourſe to Figures, and imagine they will give you any Light by comparing them with the Plants,you will be miſtaken; for we have no Figures of the Ancients, except thoſe of *Dioſcorides* in a very old Manuſcript kept in the Emperor's Library, all the Figures we have are made by the Moderns; and therefore you muſt learn this from a Maſter; and when you perfectly know the Names of Plants, then you may frequent the Garden and compare their Texture with their Deſcription given by *Dioſcorides*: And then you may diſcover the Truth.

XII. The beſt Method of attaining a perfect Knowledge in Botany is moſt certainly thus to be directed by a Maſter, who will ſhew you every Particular, and by this means you will perfectly know all the Principles of Botany, and every thing that belongs to them; but if you do not take this Method, as it is too ſeldom done, then you muſt learn the ſhorteſt Way you can what are the Elements of Botany.

XIII. The firſt Method of Learning the Nature of Plants is call'd an Inſtruction, by which known Plants are beſt kept in Memory, and new Plants diſcover'd moſt eaſily referr'd to the old known ones. The End then of this Method is not to explain the Virtues or Powers of Herbs, for theſe may be vaſtly different in Plants of the ſame Claſs; for Example, in that ſort of *Solanum*, call'd *Belladona*; which differs in its Virtues extremely from the *Solanum* commonly ſold in Shops: For after taking the firſt there enſues a melancholy Madneſs; whereas after taking the latter the Body is entirely affected with a pleaſant and very agreeable Cold.

XIV. But as there are above ten thouſand ſeveral Plants, the *Latin* Tongue is not ſufficient to give a particular Name to every one of them; we muſt therefore firſt give them a general Name, and then ſome other Name particular, which may diſtinguiſh them from others; for Example, there are many Species of *Solanum* which are all comprehended under this one Word: Some Adjective therefore muſt be joyned with it that may diſtinguiſh one of their Species from other; for Example, *Solanum Officinale*, *Scandens*, *Soporiferum*, which may explicate its Virtues.

XV. *Tournefort* has very excellently defined Botany to be a Syſtem adapted for giving Names to Plants which are reduced under *Genus*'s and into Claſſes by general and ſpecial Characters; for Example, *Solanum* bears a ſingle leav'd jagged, roundiſh Flower, its Cup or Shell B thin and membranous, but bulging and ſwelling out, whoſe inward Stalk or Peſtle runs into a ſoft Berry full of a great many flat Seeds; as often as you meet with this Deſcription or Character given to any Plant, you may be aſſured it will be call'd the Plant *Solanum*, not that its Virtue is proper and familiar; but by thus adding other Words you immediately underſtand its Species, and if I have but a good *Index*, I ſhall plainly ſee in it the whole *Genus* of *Solanum*, and ſome particular Name added thereto for Diſtinction; for Example, *Spinoſum*, *Scandens*, *Officinale*, &c.

XVI. The ſecond Method is, by which Plants newly diſcover'd may be referr'd to their reſpective *Genus*. Amongſt ſo many thouſand Plants there are only ſeven hundred deſcrib'd by *Tournefort*, under which ſeven hundred general Heads eleven thouſand Plants are comprehended, ſo that the Difficulty of retaining their Names is not ſo great; and it is very eaſy to give a new Name to a late diſcover'd Plant. Thus, for Example, if I have found out a Plant with ten Leaves, bearing a roſy coloured five leav'd Flower, the Fruit ariſing out of the Stalk having a ſoft fleſhy Pulp, I ſhall undoubtedly place this as a Strawberry Species, having the Idea of the new Plant and knowing the Character of the old.

XVII. The End and Deſign of this Method is to help the Memory, and to range every thing diſtinctly in its proper Place. That Syſtem therefore is ever the beſt which is moſt eaſy; I do not ſay which is moſt natural, for we do not know what that is: But if you examine all Syſtems whatſoever, you will very eaſily find that of *Tournefort* to be preferable to all the reſt, as having reduced every thing to a very few general Heads, and yet without Confuſion. He took his Character and Mark from Fruit and Flower: Indeed it is not perfect, for no one Man could ever perfect ſuch a Work, but yet it is moſt eaſy.

XVIII. If therefore you would learn the Elements of Botany, and the Method by which new Plants may be reduced to their proper Claſſes, and how to make new Claſſes, read *Tournefort*'s Preface, and if that does not ſatisfy you, read his *Appendix* after his *Elemens de Botanique*, in which he has explain'd all the various Acceptations of every Term, and every Name and Ge-

nus. The reſt of that Work is nothing elſe but ſettled Rules.

The Method which Mr. *Ray* took (an Author ever to be mention'd with Reverence and Honour) muſt likewiſe be conſider'd; there was ſome Diſagreement between theſe two principal Botaniſts of the laſt Century. *Ray* would have the Figures, Reſemblances, or Characters of Plants to be taken from all thoſe Marks in which there was any Agreement or Likeneſs in reſpect of the Flower, Fruit Colour, Virtues, and reduced all ſuch as had many Things common to each other, to the ſame *Genus* tho' they were not alike in Fruit and Flower: Not that he deny'd you ſhould have any Regard to theſe Notes or Marks, but he would add others. In this Syſtem you muſt attend to a great many Things at once, but it is not ſo in *Tournefort*, who has fewer general Heads. But if the *Genus* of Plants is to be taken from what they are alike (or agree) in, then *Ray*'s Method muſt prevail; for, as I ſaid before, *Tournefort*'s Method has much the fewer general Heads, as being better accommodated to help the Memory; it is therefore the beſt of any for Beginners. But if a Phyſician would be more perfect in this Knowledge, he muſt have recourſe alſo to Mr. *Ray*'s Method, and ſo in two

Years time, he may learn all the Elements of Botany.

XIX. The *Methodus Riviniana* has reſpect only to the Flower; the *Methodus Hermanniana* only to the Fruit or Seeds they are both very plain and ſhort, but the Plants cannot be ſufficiently diſtinguiſhed from thence. *Moriſon* had read *Adrianus Cæſalpinus* the Pope's Phyſician, and all he has he borrowed from him; *Hermannus* took his Method from *Moriſon*; for he makes uſe of *Moriſon*'s Names in his *Horto Lug. Bat. & in Paradiſo Batavo.*

XX. Whoever after reading theſe Authors would deſire to know the Method of ancient Hiſtory muſt read the Works of

1. *Fabius Col~~onna~~*umna, who is the beſt that ever wrote on this Subject; and there he will ſee whether any Herb be what is mentioned by *Hippocrates*, *Dioſcorides*, *Pliny*, &c. for this Author with his own Hand made exact Draughts of the Figures of Plants, and engraved them in Braſs; his Works are only two, *viz. Phytobaſanus*, and *Ecphraſis Plantarum minus cognitarum*, printed at *Rome* in *Quarto*. He had read *Dioſcorides*, who ſays that ſuch an Herb would cure the Epilepſy; and when he labour'd under that Diſtemper, he found

that Herb out, and apply'd it, but without any Succeſs; he began then to doubt whether Phyſicians really knew this Herb of *Dioſcorides*, which made him apply himſelf to the *Greek* Tongue, and by that means found out the true Herb, and ſo cured himſelf; and after that he gave himſelf up entirely to this Study of Botany. Theſe Books can ſcarce ever be printed again, becauſe no one now in the World can engrave them ſo well. The Ancients for the Space of two thouſand forty Years have written of the *Materia Medica*. This Study of Antiquity requires Botany, that you may know for certain whether this or that Plant be truly the ſame that has been deſcribed by Antiquity, and to which ſuch Virtues have been attributed by others.

2. *Joh. Bauhinus*, a very learned Author, who wrote the Ancients Hiſtory of Plants in three Vol. in *Folio*. In him you have all the Ancients have deliver'd down in Relation to the Virtues of Plants. This Author may be reckon'd as a Writer of the Pandects of Botany; his Collections are an indefatigable Labour, and are taken from *Col~~onna~~*umna and others: Add to theſe,

3. *Moriſon* and *Ray*. If you compare *Moriſon* with *Bauhinus*, you will find he has many new Plants, all digeſted after the

Method of *Cæſalpinus*, which *Bauhinus* has not. But take what Plant you will, and you will find all its Virtues in *Bauhinus*, if you compare him with *Moriſon*. But *Ray* was perfect in all, if perhaps ſome more Modern have not excell'd him in uſing another Method. *Bauhinus* has every thing to be met with in *Moriſon* and *Ray*, except ſome later diſcover'd Plants.

XXI. What Authors are to be read that you may in a ſhort Time acquire a true and uſeful Knowledge of the Virtues of Plants? They who will moſt faithfully inform you, are,

1. *Schroder* in his *Pharmacopœia*, moſt faithfully extracted from *Ray*, *Dodonæus*, and *Lobelius*; this Book tells you the Virtues of Plants, as they relate to the Shop, and is an admirable Treatiſe.

2. *Markgrave*, who alſo excell'd in this Subject: But if you deſire to know the Virtues and Powers of all Plants, read,

3. *Dodonæus* in *Folio*, printed at *Antwerp* in the Year 1644. This Work contains whatever is taken Notice of by *Chigi*, *Æginett*, and *Orbaſius*.

4. *Dioſcorides*, with *Mathiolus*'s Notes, which is by far the beſt Edition.

5. *Tournefort* in his Treatiſe, *Des Plantes qui naiſſent aux environs des Paris*. He was

an admirable Searcher into Chymiſtry. And

6. *Lobelius* in his *Opera Botanica* in *Folio*, as to the Virtues of Plants is moſt admirably exact.

We have been hitherto examining what does not *properly* relate to our Body, and which any one may perfectly learn. We come now to diſcourſe of thoſe Things which *properly* do ſo.

The End of the firſt Book, containing what is moſt material in relation to the Introductory Study of Phyſick.

BOERHAAVE's
METHOD
OF
Studying Phyſick.

Book II.

Of the Study of Anatomy.

Introduction.

I. A PHYSICIAN, or he that is to be ſo, having all Qualities requiſite for his Science, muſt now ſtop here, and ſeriouſly contemplate what is contained in this Second Book, that he may enter into the more ſecret Receſſes of Phyſick with the greateſt Profit and Advantage to himſelf in ſuch Study.

I have told you that a Student in Phyſick ought to know from the Mathematicks, Phyſicks, Natural Hiſtory, and the *Materia Medica*, whatever belongs to the general Study of this Science, and in what Order he ought to inſtruct himſelf; but all this may as well be learn'd by a Philoſopher as Phyſician. He muſt therefore likewiſe know what a Human Body is, how it acts, by what Virtues or Remedies it is affected when it proceeds to act, decay, or recover its Health: It is abſolutely neceſſary therefore, that he know,

1. *What he muſt learn.*
2. *What Order is moſt proper for him to make uſe of, that is, how he may with the leaſt Expence, after the eaſieſt Manner, and in the ſhorteſt Time, learn it by the Help of his Memory. And then he muſt be ſhewn how all theſe may be reduced to Practice: And this is all which belongs to this Study.*

II. And whoever conſiders well all theſe Conditions, and all Things which offer themſelves to be known in the learning of this Science of Phyſick, will ſoon ſee that *Anatomy* is the chiefeſt of all what he ought to be throughly acquainted with, and this *Riolanus* more properly call'd

['Ανθρωπογραφία] *Anthropography*; for it is rather a Deſcription than Diſſection of a Human Body. For which Reaſon *Veſalius* did very well in calling it ['Ανθρωπομηχανὴ] the Fabrick or Structure of a Human Body, which if a Phyſician does not perfectly learn, all his future Studies will be in vain. For a Human Body only is the Object of Phyſick, and the more any one knows of this, the more he knows of Phyſick. For as every Diſtemper in Man is a Defect of the Body from its natural State, ſo will he be ignorant what this is, unleſs he know what a Human Body is; for Example, ſuppoſe the *Os Humeri* be diſlocated from the *Scapula*, it is impoſſible I ſhould know what the *Os Humeri* or *Scapula* mean; or what is a Rupture or Diſlocation of the Tendons and Ligaments. Again, ſuppoſe any one tells me that a Fever is nothing but a violent Agitation of the Pulſes, yet will he never be able to explain what a Pulſe is unleſs he know what are the Arteries and the efficient Cauſe of the Pulſe in the Arteries; nor can he know this without he knows what is the Heart and its ſtrict Connection with the Arteries and Blood. The Matter of all Diſtempers, even the moſt intricate, may be found out and diſcover'd by Anatomy. This Science we likewiſe call Ἀνθρωποτομία, by which we mean the Deſcription of the Matter, Figure, Structure, and Connection of thoſe Parts which conſtitute a living Human Body as capable of being ſhewn to us by an artful Hand. It is agreed that Anatomy is very uſeful in Surgery, that a Surgeon may know how to reduce a diſlocated Bone into its former State; thus in any Inflammation, either external or internal, the diſlocated Blood muſt be reduced into its proper Veſſels.

III. I ſhall now give you the beſt Counſel and Advice I am able in relation to this ſo uſeful and neceſſary a Study, and in ſuch a Method as coſt me much Labour and Reading.

IV. This artful Expoſition diſcovers in the whole Body of Man either the coherent or firm Parts which are uſually called ſolid Parts, by *Hippocrates* the containing Parts [τα ἔχοντα] or the fluid Parts, which the *Latins* called Humours [*Humores*;] but now leſs properly Liquors or Liquids. *Hippocrates* call'd them, the Parts contained [τὰ ἐνεχόμενα :] But *Foeſius* has much mended the Expreſſion by adding the Term, cauſing Violence [τά ἐνορμάȣντα,] which is the third between the two former Principles: For it muſt be obſerved that *Hippocrates* did not call them Animal Spirits, but *Impetum facientia*. One Member is very improperly ſaid to be divided into ſolid Parts, for the ultimate Fluids are equally ſolid, they are therefore more properly called firm Parts.

V. Anatomy therefore is wholly diſtributed thro' theſe various diſcover'd Parts; ſo that Anatomiſts ought likewiſe to have explained the Nature of a Fluid, which alſo is a Part, tho' they have only treated of Muſcles, Arteries, Veſſels, *&c.* I ſhall therefore diſcourſe of theſe two Parts, *viz.* Fluids and Solids in their Order.

VI. The firſt Part therefore of Anatomy by Diſſection diſcovers to you and deſcribes the Matter, Figure, Structure, and Connection of the firm Parts which concur to the conſtituting this Body: Wherefore,

1. *Is to be learn'd the Matter of the firm Parts, that is, what contributes or concurs to conſtitute theſe firm Parts; and this no Anatomiſt hitherto has done; for Example, I ask what is a Muſcle? He will tell me that it is a Body made up of Arteries, Veins, Lymphaticks, and other Things; I ask then what is an Artery? I ſhall*

I ſhall be anſwer'd, it is Membranous. If I ask what a Membrane is, he cannot tell. Upon which Account it is moſt certain that Anatomiſts make prodigious Miſtakes in deſcribing the ſimple Parts of a Body: For Example, a Bone when thoroughly examined by Chymiſtry yields Water, a volatile Spirit, different Oils, and much Earth, and they tell you this is the Matter of Bones, but they are groſly miſtaken; for every Peaſant knows that if Bones are expoſed to the open Air, or laid in a Grave, they have nothing of theſe in them but Earth, and yet they are Bones. In deſcribing an Artery, you come to that of a Membrane, and a Membrane is the Texture of all Kinds of Veſſels; but if you would know the Matter of a Membrane, you muſt take away all that is fluid: And this is what we ſhall firſt inſtruct you in.

2. *Their Figure offers it ſelf to your Conſideration, and* Bellinus *alone has performed more on this Subject, than all Anatomiſts together in their numerous Volumes.*
3. *Their Structure which is the entire Deſcription of their Form and Fabrick, and this has been the Work of* Malphigius *and* Ruyſchius.
4. *Their Connection: And when you have known*

known all theſe, you will know the firſt Part of Anatomy.

VII. That a Phyſician may moſt perfectly know the whole Nature of theſe firm Parts, it is abſolutely neceſſary that he be firſt acquainted with thoſe Parts out of which the ſmaller Parts are compoſed, and into which they are again reſolved. It has been a matter of eager Contention which were the ultimate Elements of a human Body. Of this ſee all Anatomiſts that have diſputed about the firſt Bodies out of which our Body is compoſed, and what was the Original of its Form.

VIII. But theſe ultimate Elements and ultimate *Stamina* of the leaſt as well as greateſt Parts are *Corpuſcula*, or little Bodies, very *minute*, *ſimilar*, *ſimple*, and *terreſtrial*, ſecreted from the fluid Humours at their proper Places, and appoſite to all the Parts of a Body.

1. They are very *minute*. For every one of the largeſt Species is made out of a Veſſel which is a Membrane, and which Membrane is compoſed of other Veſſels, and thoſe Veſſels of other Membranes; which Membranes again are compoſed of ſolid Particles, purely and ſimply the moſt minute of all, and which are extended, partly

ly as to Length, and partly as to Breadth, firmly cohering and admitting no Cavity.

2. They are *ſimilar*, for I my ſelf have examined by Fire (Chymical) and have ſeparated the ultimate Solid, or firm Parts of all Animals, whether Bones, Arteries, Veins, or Membranes free from all Humour or Liquid; for if theſe are continued in boyling Water 'till the Water that ſhall from time to time be added, can receive no farther Tincture, but becomes inſipid, then the remaining Bodies are *Similar*. A Muſcle ſoak'd in lukewarm Water continues pale and free from Blood; but let that be boyled over and over ſeveral Times, and then there will remain a Maſs of dry Fibres; if it be then burnt, the Fibres ſtill continue, but in a long Figure as in their former Condition. If you make this Experiment on a Bone, Artery, or Nerve, you will always find ſuch Matter equally alike in all. Every Part has its Firmneſs. In an Embryo the great Artery is ſo very ſmall, as you may blow it away with your Breath, but the ſame *Stamina* are made firm by adding the ſame or the like Matter. And thus out of the moſt minute the greateſt are framed, and ſo the ultimate Matter of a Lymphatick is the ſame as the ultimate Matter of the Bones, only that in theſe the Particles are more

compacted together: So that all Parts differ from each other by a greater or leſſer Compoſition or Addition of the moſt minute Solids; all firm Parts then are compoſed only by Appoſition of others, and therefore the *Corpuſcula* of all firm Parts are *Similars* the moſt minute.

3. They are *Simple*, for that is a ſimple Body in which every Part is the ſame, and of like Nature with the whole; for Example, I take an Artery and Bone, and examine both chymically, and find the ſame undiſtinguiſhable *Genus* of Parts, the ultimate Parts therefore cauſing Firmneſs in the whole are always *Simple.*

4. They are Terreſtrial. By Chymical Experiments Bodies are divided into theſe Species, *viz.*

1. *Salt Bodies which may be diſſolved in Water, or ſeparated by Fire.* may
2. *Into Oily Bodies* [Oleoſa] *which ~~cannot~~ be burnt by Fire, but ~~may~~* cannot *be mingled with Water.*
3. *Into Spirituous Bodies which evaporate of their own accord, and may be ſet on Fire or not, and may be mingled with Water.*
4. *Into watry Bodies which melt before the Fire and evaporate without any Smell or Taſte:* And,

V. *Into*

5. *Into terreſtrial or earthly Bodies which can neither be deſtroyed by Fire or Water, but keep their Firmneſs in both theſe Elements.*

For which Reaſon the Moderns call all the Parts of a Body, Salt, Oil, Spirit, Water, and Earth, and you will ſee in *Du Verney*, where he diſcourſes of the ultimate Parts, that he aſſerts Animals to conſiſt of theſe Five, and that the ultimate of all is mere Earth: So that this laſt, properly ſpeaking, is what can give Firmneſs to our Body, and into which all the reſt are reſolved.

VIII. That is a Body compoſed of fluid Humours which now is a Body of ſuch a *Moles*, and was before indeed a Body, but Millions of times leſs: That weighs now 160 Pounds, and only one Grain before, and the whole, which occured of ſo little a *Moles*, is formed by the Appoſition of the moſt minute *Corpuſcula*. And as it muſt of Neceſſity increaſe equally, this muſt of Conſequence be effected by Fluids, which can ſpread themſelves into all fluent Places thro' Veſſels. All of them therefore are compoſed of Fluids.

IX. I know of none who have written of the Nature of theſe ultimate Parts;

and therefore can recommend nothing to you, unleſs it be what is briefly contained in my *Inſtitutiones Theorætica*; and eſpecially in my *Aphoriſms* in the Chapter *de Morbo Solidarum Partium*, and (if it conſiſts with Modeſty for me to ſpeak it) what I have now for theſe ſix Years paſt taught at home in the Elements of Chymiſtry, and the Experiments there made in the third, fourth, and fifth Operations: This I take to be the beginning of Anatomy, *viz.* that you have a diſtinct Conception of the minuteſt Parts of which the reſt are compounded.

X. After a young Beginner in Anatomy is perfectly acquainted with this, then muſt be demonſtrated and explained to him the ſmalleſt Fibre of the firm or ſolid Parts which can no farther be reſolved than into the above named Elements, out of which compounded Fibres the moſt minute and moſt ſimple Membranes are formed.

XI. Such a Fibre therefore is a very minute ſlender Body, conſiſting of conjoined Fibres merely Terreſtrial. Now that Part has theſe Proprieties, for it can never be reſolved into other Parts, for then it would not it ſelf be ultimate; and if a great many ny of ſuch like Parts be joined or knit together, they compoſe a Membrane the moſt ſimple, conſiſting not of Veſſels but mere Fibres; for Example, Flax grows up to a tolerable Height from Seed and Earth, when it is ripe, it is mowed down and is a Kind of Hay, it putrifies: All the Moiſture it contains is then ſo ſmall as it evaporates. After this, it is expoſed to the Sun, all its Veſſels are cut into Fibres, (and our Flax-Dreſſers beat it into very ſmall ones) then theſe Fibres are made into Threads, which afterwards being ſpun is what they make Linen of, which is nothing elſe but a mere Congeries of Fibres like Membranes in a Body the moſt ſimple; which Membranes are Coverings compoſed of Fibres put long ways together. Theſe Veſſels are compoſed of Membranes, which again are likewiſe compoſed of other Veſſels and Membranes; but the ultimate moſt ſimple Veſſel is made of a Membrane the moſt ſimple making a Cavity, and this Membrane (as hath been ſaid) of Fibres.

XII. It is a Queſtion what this ultimate Membrane and ultimate Veſſel are compoſed of. A Veſſel boiled a conſiderable Time in Water, and after a continued Repetition of pouring on it freſh Water loſes all its Juices, and dry as it is it keeps its ancient Form; then view it through a Microſcope, it tells you what an ultimate Veſſel is. An ultimate Membrane has nothing but earthy Parts, and if it be ſo turned about as to form a Cavity or Hollow, it is a Veſſel the moſt ſimple that can contain a Liquid. In a Veſſel therefore are two Things, *viz.* a Cavity or Hollow, and ſomewhat elſe forming that Cavity or Hollow, and its conſtituent Parts are not little Veſſels but Fibres not hollow. There is ſcarce any Body more ſeparate than Hair, if I put it into a proper Veſſel and burn it (but hold it as ſteadily as poſſible) all its Juices will fly away in a clear unſmoaky Flame, but its Figure continue; if then it be ſhaken, it is nothing but mere Aſhes; (this muſt be done in a very clear Fire, where there is no manner of Smoak) a Membrane therefore is not deſtroyed in Water or Fire. This Boiling, Drying, and Burning plainly ſhew us, that a Hair is a Veſſel; the moſt minute Veſſel therefore is what I have juſt now deſcrib'd to you.

XIII. I know of no Authors who have written on this Subject, I cannot therefore recommend to you any ancient or modern; I would have you however conſult my *Chymical Elements and Aphoriſms* I mentioned to you above.

XIV. After this our future Anatomiſt will learn what the Fibres of the moſt minute Canals compoſed of the moſt minute Membranes are, and their various Texture according to the various Modes by which the Fibres or little Canals are mutually joyned together, *viz.* by a Parallel, interwoven or ſpiral Concourſe.

I will now preſent you with a very agreeable Subject Matter, and worthy your ſerious Conſideration and Reflection. The ultimate Veſſels are ſo very minute that one hundred Millions may be contained in one Grain of Salt or Sand; for if they could be gather'd all up together in one Heap, they would not equal one Hair of a Man's Head; but yet as the Hairs of our Head have Cavity, ſo alſo have theſe moſt minute Veſſels, and are compoſed of Fibres diſpoſed after that manner as I have told you. I have now ſhewn you what thoſe things are, by a cloſe Connection of which, what are moſt minute in our Bodies are compoſed of: And what muſt be carried to every individual Place to nouriſh them; nor is there any other Method of knowing this than what I have here told you.

1. I have given you Demonſtrations *a Priore*: And,

2. By Chymical Reſolution we ſhall find *a Poſteriore*, that ſuch and ſuch Parts are thus compoſed; for Example,

1. *The moſt ſimple Elements are brought together.*
2. *A Fibre is made out of theſe thus brought together and united to each other according to Length, or it may be according to ſome Kind of Breadth, and is nouriſhed by a mere Appoſition which has no Cavity, but is like a Thread of united Elementary Parts.*
3. *A Membrane is compoſed of theſe moſt minute Fibres mutually uniting themſelves to each other after a triple manner,* viz. *according to Length it is compoſed either of right Lines placed cloſe to each other, or by an interwoven Concourſe of long Fibres, and then it is a thicker Membrane than the former, and more compoſed and compacted; or laſtly, by Contorſion, and then a Membrane is compoſed or compacted and ſtrong in the higheſt Degree, tho' it be like the other two ſimply compoſed of Fibres.*
4. *Is made a more ſimple Veſſel which forms a Hollow to be contained in another fluid Body, and whoſe cloſed Hollow is a moſt ſimple Membrane turned round in Shape of a Veſſel. And here we muſt ſtop; for*

for it would be an infinite Nutrition, if there were no End of Veſſels, that is, if we were to proceed in Infinitum. *But other Membranes which are not ſimple are compoſed of ſmall Veſſels; the Membranes therefore of thoſe which are the next to the laſt or ultimate are compoſed of minuteſt Veſſels.* Bellini *[at the End of his Works] is the only one that has ſaid any thing of this Subject.*

XV. The Trifles of the *Ariſtotelians* in relation to compounding Elements, *&c.* are very difficult; thoſe Veſſels which an Anatomiſt demonſtrates are by no means the moſt minute; but a Congeries of Veſſels the moſt minute. Suppoſe (which ſeems to be a Paradox) the great Artery conſiſted of a Million of Veſſels differing from each other in one Degree only, for a great Veſſel has a Membrane, whoſe compounding Parts are Fibres or Canals, and theſe are the moſt minute, or not; they are therefore again compoſed of ſmaller, which alſo are a Congeries of Veſſels; and therefore it is a Queſtion, whether a Body as ſoon as it begins to be formed has theſe Canals?, Undoubtedly it has, but by the Help of the Blood's Circulation, the largeſt Veſſels are extended, and the leaſt are compreſſed and grow together, which makes them every Day leſs in Number; and thus from the Concretion of theſe moſt minute Veſſels is made a Fibre which is now much ſtronger than when it was a Veſſel; and thus all the thicker Fibres were once little Veſſels, but now the Liquid being expreſſed the moſt minute Canals grow up together into one Fibre, which alſo is compoſed of a great many other Fibres; and when this is done in the minuteſt Veſſels, there grows Strength, but in the greateſt a *Callus*.

XVI. The minuteſt Veſſels of a Body cannot be perceived by the bare Eye, or even through a Microſcope; for which Reaſon we can only form an Idea of them by Arguments taken from the greater Veſſels known to us. For all what I have ſaid concerning Fibres and Membranes I cannot (properly ſpeaking) demonſtrate to you; but I ought to ſhew you that they are ſo very ſmall that they cannot be ſeen through a Microſcope, and I think in this I ſhall act by you with the utmoſt Fidelity; for I muſt recommend to you the uſe of the Microſcope, for nothing more confirms an Anatomiſt than that uſeful Inſtrument.

XVII. That you may the better underſtand that there are Canals in a Body much leſs than can be diſcovered by the Microſcope, I ſhall in a few Words give you its Hiſtory in relation to Anatomy.

The moſt curious Searchers have thus proceeded: Suppoſe, for Example a Magnitude *A*. to be one Inch, and————A which may be divided into an B hundred conſpicuous Parts; ſuppoſe *B*. to be ſuch one hundredth Part, as the Diameter of a Grain of Sand may be; but all thoſe who have made uſe of the Microſcope have diſcovered that the Diameter of a red Globule in the Blood is one hundredth Part of the Diameter of a Grain of Sand, that is, if one hundred red Globules of Blood were placed cloſe to each other, they would occupy the Space of the Diameter of one Grain of Sand. Since therefore the Diameter of a red Globule of Blood is the hundredth Part of the Diameter of a Grain of Sand, and the Diameter of a Grain of Sand the hundredth Part of an Inch, the Diameter of a red Globule of Blood muſt be of Conſequence the ten thouſandth Part of the Length of an Inch. But Microſcopes plainly ſhew us that there are Veſſels that carry Blood thro' which only one red Globule of Blood can paſs; but as there are Spaces between them like Squares of Diameters, a Square Inch will be capable of containing one hundred Millions of ſuch Veſſels. Theſe Veſſels may be perceived by the Eye. Beſides theſe there are others which are tranſparent but not perceptible, and through a Microſcope I plainly ſee that this Globule runs through tranſparent Globules.

XVIII. There are in our Body Veſſels which carry Water from one narrow Space to another more narrow, but the greateſt of theſe that I can perceive does not equal that Veſſel which tranſmits a Globule of Blood. This Water as *Lewenhoeck* has evidently demonſtrated is in its Parts ſix times leſs than a red Globule of Blood, there will therefore be 3600, 000, 000 of theſe Lymphatick or watry Veſſels in a ſquare Inch: But if you take in *Sanctorius*'s Veſſels of Perſpiration which are much leſs, as pouring out Liquids which being placed near the Fire do not thicken but evaporate, and conſequently are of ſuch extraordinary Tenuity as to leave no Fæces behind them; how ſmall then muſt theſe Veſſels be? And yet tho' a Man was to live a hundred Years, they would remain whole and entire.

XIX. *Lewenhoeck* in his firſt Volume of his Letters to the *Royal Society* of *England*, wherein he deſcribes the Brain by the Microſcope,

croſcope, tells us that the ultimate Thread or Filament in the Brain viſible thro' a Microſcope is only the ſixty fourth Part of the Diameter of one red Globule of Blood, the Diameter therefore of one of theſe Filaments or Veſſels in the Brain is the 640, cooth Part of an Inch, and therefore taking in their Squares 40, 960, 000, 000 of ſuch Veſſels are contained in one ſquare Inch: But the Eye can no ways diſcover Veſſels ſo very minute and ſlender, but by the Help of a Microſcope.

But the Queſtion is, whether theſe Veſſels are the ſmalleſt of all? I ſhall demonſtrate that theſe only differ from the moſt minute, as the Globe of the Earth does from a Grain of Sand. It is evident from Experiments that the *Animalcule* in Human Seed is the Baſis or Foundation out of which afterwards is formed a Human Body, there muſt therefore be in it all theſe Veſſels; but the Magnitude or Diameter of one *Animalcule* in the Seed is by the Microſcope found to be 100, oooth Part of an Inch; in relation therefore to a Cube, a cubical Inch will contain 1, 000, 000, 000, 000, 000 of theſe *Animalcules*; for as many of theſe Veſſels there are in us, ſo many Veſſels muſt there be in theſe; the only Difference between us and them is, that they have a much greater Number of Veſſels than an adult Body: For in an adult Body they are always growing more compact, cartilaginous, *&c.* and conſequently fewer in Number, and this Decreaſe ſtill continues 'till thro' Diminution of Veſſels we die of old Age.

XX. Whenver you hear an ultimate Veſſel deſcribed, do not believe it to be the ultimate Solid, for 10000[illegible] of them may be contained in the Compaſs of a Grain of Sand; compare what has been ſaid with relation of the Number of the Sands of the whole Earth, which *Archimedes* computed. Well therefore did the divine Prophet ſay, that God had created our Bodies with a divine and infinite Workmanſhip.

XXI. After a Phyſician has his Underſtanding well imbued with this Idea, then let him endeavour to digeſt his Study of Anatomy: In which he will learn nothing but the Parts viſible to the naked Eye or Veſſels *per ſe* or filled with a thick injected Liquor: Do not hence conclude with ſome great Men that the minuteſt Veſſel can be demonſtrated; for *Galen* heretofore, and in our Days *Swammerdamm*, *Nuckius*, *Ruyſchius* and *Ravius* have forcibly injected ſome Liquor to that Degree, that the Veſſels have been dilated beyond their natural Extenſion; they injected opacous or thick Bodies, as Wax or Oil of Turpentine, they notwithſtanding confeſs they only attained to the Knowledge of the largeſt of the minuteſt Veſſels: nor muſt it be ſaid that there are no other Blood-veſſels than theſe, tho' they ſeldom come to the Veins. The ſame may be ſaid of Quickſilver.

XXII. The whole Study of Anatomy is divided into four Parts,

1. *The firſt treats of the Bones and their proper Parts.*
2. *The ſecond of the Muſcles and their Parts.*
3. *The third of the* Viſcera *or Bowels, and the Parts belonging to them :* And,
4. *The fourth of Veſſels without the Bones, Muſcles, and* Viſcera, *or which are contained within them. Of all which in their Order.*

◆

The firſt Part of Anatomy, or Oſteology.

THIS Part treats of the Bones, and of their proper Parts; for other Parts depend on theſe firm Parts, and therefore I cannot aſſign their Situation, unleſs it be in relation to the Bones; for Example, the Heart is placed in the Cavity of the Breaſt, and depends upon the firm Parts, but there are no firm Parts in the Body beſides Bones and Cartilages: So the Brain has its *Cranium* or Scull which is firm, whereby its Dimenſions may be taken. If you have never ſo learned an Anatomiſt to inſtruct you, if he does not begin from the Bones, he will never give you a true Idea of any thing; for the Knowledge of the Bones is the very Baſis and Foundation of the Practice of Phyſick, becauſe Diſtempers and Affections of Parts are known by the Deſcription of the Bones. This firſt Part is therefore aptly call'd *Oſteology*, or a Treatiſe of the Bones, which I will diſpatch in three Poſitions or Concluſions: I will not only give you a Deſcription of the Bones, but of all Things elſe which belong to the Bones as Bones.

1. *The firſt is* Oſteo~~logy~~geny, *which teaches you what is the Matter and Origin of Bones, and what is their Condition in the firſt Part of Subſtance.*
2. *The ſecond is* Oſteography *which teaches the Knowledge of their Structure in adult Bodies, the Deſcription of their Make, what Cellules, right and tranſverſe Fibres, and Marrow is in them.*
3. *The third is* Synoſteology, *which explains thoſe Parts in the Bones which make one Bone to be connected and knit together either with or without Motion.*

The ſecond Part, or Myology.

THIS Part is ſo called becauſe the Part making Motion has the Reſemblance of a Mouſe, *viz.* it has one ſhorter Tendon, then a Kind of Belly and a longer Tendon like a Mouſe's Tail, ſo that it does not very improperly look like the Figure of a Mouſe, which in *Greek* is Μῦς, in *Latin Mus*, and in *Dutch Muys*, and this Part is divided into two others, *viz.*

1. Sarcology, *or the Deſcription of muſcular Fleſh.*
2. Aponeuroſiology, *or a Deſcription of the*

the Tendons which collect or gather together the Muſcles in fixed Points, for Ἀπονέυρωσις *ſignifies going out of the muſcular Fleſh into tendinous or nervous Subſtance.*

The third Part or Splanchnology.

THIS Part treats of the *Viſcera* or Bowels; under this Name I comprehend a remarkable Body contained in one common Superficies, conſiſting of a great many Veſſels, and (as it is for the moſt Part) of ſeveral Glands collected into one Body whoſe Effects chiefly are to change Liquids, or to make ſome great and ſingular Secretions. The Brain therefore, and all its Parts, the Lungs, Liver, Spleen, the *Pancreas*, Stomach, Inteſtines and Womb in Women are properly *Viſcera*: But the Heart is not, for it is a Muſcle. This Part is called *Splanchnology*, and teaches us the Connection and Situation of the *Viſcera*, and their Leading, Secreting, and other Veſſels.

The fourth Part, or Angiology.

THIS Part treats of the Veſſels: But what is a Veſſel? For all the *Viſcera* are Veſſels. By Veſſels I underſtand all thoſe Canals which are without the Bones, Muſcles, and *Viſcera*; and this Part is called *Angiology* from Αγγέιον, a Veſſel.

Now here ſeems to ariſe a Doubt, *viz.* to what Part we ought to refer the Nerves either under that of the *Viſcera* or Veſſels: Moſt certainly to *Splanchnology* in as much as they are Productions of the Brain, and to *Angiology* in as much as they carry a diſtinct Liquid.

All theſe Parts, for Order ſake, ſhall be diſtributed into the four general Heads or Chapters following.

CHAP. I.

The firſt Part of Anatomy.

SECT. I.

Oſteology.

I. THE firſt Part of *Oſteology* is *Oſteogeny*, which is a Deſcription of all the Changes which are obſerved to happen to a Bone from the firſt Conception in the *Ovum* to the full Growth and Maturity of Manhood, and it deſcribes,

1. *The Matter and Origin of the Bones.*
2. *The ſucceſſive Series of all Changes which they may undergo from their firſt Formation to their being entirely compleated.*

A *Bone* is the hardeſt, whiteſt, and ſmootheſt Part of a Body, and it muſt be obſerved that there can be no Body, but its immediate preceding Condition was that of a *Cartilage* or Griſle.

A *Cartilage* is a Body next in Hardneſs to a Bone, but more pliable and moſt Elaſtick of any Part of the Body. (For there are ſome Bones a little ſoft, that are not in the leaſt elaſtick,) it is (I ſay) next to a Bone the hardeſt of any Body; for all the others are either Fleſh, Veſſels, or Membranes. And it is diſtinguiſhed from a Bone by its Elaſticity; for a cartilaginous Globe is the moſt elaſtick of any, and this makes it to have in our Body ſuch Uſes as are inimitable by the other Parts; ſo that wherever there is a Neceſſity of a reſiſting Power in us Nature has made it cartilaginous. Thus the *Apophyſes* and Cavities in the Articulations are covered with a Cartilage, that they may, of their own accord, reſult or fly back when they are turned about. The Extremity ty of every Rib has its Cartilage, for theſe elevatory and depreſſory Muſcles are very ſtrong though not large. For which Reaſon Nature has fixed to them a pointed (Sword-like) Cartilage, and the Cartilages of the Sides placed cloſe to it, that by their Force and Power the Breaſt may be compreſſed inwardly, and this is the only Cauſe of Reſpiration in our Sleep, tho' we do not attend to it.

II. *Cartila* in *Greek* χόνδρος or χόνδρον immediately before its changing into a Cartilage was a Membrane; and there is no Cartilage in a Body, but what was ſo: For in every *Fœtus* within the Month there is no Bone, but only cartilaginous Points which grow every day greater, but the Part immediately next them is always a Membrane.

A Membrane in the *Greek* ὕμην or μήνιγξ (which Name is not only given to the Membrane of the Brain, but to all the others) is a very pliable Body, and neareſt to a Cartilage. I do not here give you the Deſcription of a Bone, Cartilage, or Membrane, but only number their *Phænomena.* Every Membrane is a Texture of Veſſels and Fibres, it is a kind of Sheet where the Filaments or Threads are cloſely interwoven (as in Linen) ſo as to make a Plain, and this is made either of little Veſſels or

Fibres. Every Bone therefore is made of Fibres; but every Membrane conſiſts of Veſſels, which are ſo many leſſer ſimilar Membranes, ſo that every one makes a Cavity, but the laſt is fibrous, and the laſt but one vaſculous. Hence every the ſmalleſt Canal has its Membrane, which I do not take for a Texture of Fibres but Veſſels, and you may learn the minuteneſs of Veſſels from the Writings of *Hoeck*, *Lewenhoeck*, &c. for in Reality no one yet ever ſaw the laſt or ultimate Veſſels of *Sanctorius*, the ultimate Membrane therefore is fibrous.

III. A *Fibre* is a right corpuſcular Line which conſiſts of Parts conjoyned to each other, and ſo ſmall and ſlender that it admits of no Cavity; its Parts are merely earthy, in which there is neither Salt, nor Oil, nor Water; a Bone therefore is compoſed of Cartilages, a Cartilage of Membranes, and the ultimate Membranes of Fibres, and a Fibre of mere Earth, which is brought and applied to the Part by the Form of the nutritious Juice.

IV. Every Veſſel is made a Fibre if its Liquid be expreſſed, if its Sides be compreſſed and are conſolidated and grow together; and thus a great many Fibres may become one, which will be much the more elaſtick the thicker it is than it was at firſt. Hence, if a great many Veſſels of any Membrane conſiſting of the Texture of ſuch Veſſels become Fibres, then of neceſſity it muſt be more ſolid, white, hard, and elaſtick, that is a Cartilage. Look upon the various Heads of *Embryos* [*in Medio* Βρέγματος] at firſt there riſes a kind of a Cartilaginous Star, you will ſee by the Help of a Microſcope in that Cartilaginous Point thick Strewings or *Strata*, not only of compreſſed and non-compreſſed, but alſo of compreſſing Veſſels, by which it appears that a Cartilage conſiſts of theſe *Strata*, whoſe intermediate Veſſels remain looſe and unreſtrained, and thus there are in it a continued Series of dried and intermediate *Lamellæ*, which yet have their proper Fluids.

V. If theſe Cartilaginous Strewings or *Strata* are more and more compreſſed, then ſuch Cartilage becomes moſt compact, white and dry, and is a Bone.

A Bone then is a Compages of many Membranes which mutually lie on each other like thin Plates [*Lamellatim*] between whoſe Spaces are Veſſels which carry their own Liquid. But in what Part does a Cartilage begin to form it ſelf into a Bone in the *Fœtus* ? I anſwer in the very Centre. *Havers* has demonſtrated that there lies the greateſt Artery, and conſequently the greateſt Pulſe; and hence it follows that there the Veſſels are firſt of all compreſſed and become Cartilages, but by a continued Pulſe the Artery goes on in its Compreſſion, and then the Bone begins to be formed, which hardens every day 'till its Middle is ſo ſolid as no longer to recede or give way. In the Middle therefore a Bone is moſt hard and compact, but very ſmall and ſlender, the *Lamellæ* being there more repelled by the Blood, and in that Place are formed ſeveral *Cellulæ*.

VI. Having now explained after what manner all Cartilages and Bones [from theſe] are made, and that they conſiſt of various *Strata* or *Lamellæ* mutually lying on each other; we muſt look farther and ſee that there are in ſome Places between theſe *Strata* or *Lamellæ* greater intercurring Veſſels, and ſuch as carry more Liquid than the reſt, and that at the ſame time the greater Arteries, being there diſtributed, diſtend the *Lamellæ* of the Bones mutually from each other, and ſo form in the Bone ſome Cavities or *Sinus* (by its Velocity and Rapidity) which were not at firſt in the Bone, but afterwards are. The *Os Sphenoides*,

noides, for Example, in the intermediate Part in Infants is ſolid : but when an Infant is grown up it is made hollow into two diſtinct Cavities or *Sinus* with a *Septum* or Partition in the Middle, and theſe Hollows or Cavities have a Membrane and Glands to ſecrete the *Mucus*. Thus in the Forehead-Bone in an Infant of ſix Years of Age (contrary to other Bones) when it begins firſt to grow bony, there is no ſubciliar *Sinus*, but in a Perſon of twenty Years of Age and upwards, you will ſee a Cavity big enough to lay your Finger in the *Lamellæ* receding from each other and forming thoſe *Sinus*. Neither is there any Cavity in the upper Jaw-Bone in Infants; but there is a very large one in adult Perſons capable of containing ℥ij of Liquor. What Wonder then is it if the *Lamellæ*, which before were ſo cloſe to each other, being now removed from each other, ſhould form theſe Spaces which are of ſo great Uſe ? For where the great Veſſels are the Arterial Pulſe (tho' very ſoft) beats 15000 times in an Hour, thereby making the *Lamellæ* recede in order to form theſe Cavities. After this manner likewiſe are formed the *Sinus Medullares* ; for the *Caverna Medulloſa* is not proportionably great (as in adult People) which is cauſed by the *Arteriæ Medulloſæ*.

VII. I have told you that the Nutriment of all the ſolid Parts is Earth, which is ſo very ſmall that there is no Veſſel in the Body through which it cannot paſs. By the Appoſition of this Earth are formed Fibres, and out of Fibres the ſmalleſt Membranes, out of Membranes Veſſels, out of Veſſels and Fibres other Membranes, and out of the *Lamellæ* of Membranes Cartilages, and out of theſe cloſely compacted to each other are laſtly formed Bones, *&c.*

VIII. *Malphigius* in his Poſthumous Works *De Geneſi Oſſium*, ſays, that Bones conſiſt of *Lamellæ*, between which is contained a Bony Juice or Glue, which makes them ſtick cloſe to each other. The Reaſon of this Opinion of his proceeded from his obſerving that the *Callus* in broken Bones, by means of the extravaſated and harden'd ſpecifick Juice, grew into a Bone: But the bony Juice is nothing elſe but what *Havers* has deſcribed. A Bone conſiſts of 10000 viſible *Lamellæ*, between which Veſſels naturally luxuriant, and endeavouring to extend themſelves beyond the Extremity of the *Lamellæ* heave them up, and ſtretch them on every Side, and when theſe meet together and are united, they always cauſe a Swelling or Tumor; for by the Force of the Arteries they are compelled to make a greater Aſcent than before.

A Bone is thus formed in the Middle. For the moſt Part there appears a white Spot with a cartilaginous Margin, and after three or four Months then it looks like a Star, and ſends forth on every Side bony Rays, but every Ray ends in a Cartilage, the reſt is a Membrane, and after this manner it proceeds even as far as the *Epiphyſes*.

IX. It is not an eaſy Matter to learn *Oſteogeny* from Books after the Method I have here laid down, by reaſon of the ſcarcity and want of Authors; and thoſe who have written on this Subject have indeed ſome tolerable Obſervations, but they keep no Order. But the beſt are theſe that follow, *viz.*

1. The beſt that ever wrote hereon was *Kerckringius*, a Native of *Amſterdam*, he was a Man of a very quick and ſprightly Genius, and learned in all Studies, eſpecially *Anatomy* and *Chymiſtry*. He put out a Book in *Quarto* at *Amſterdam* in the Year 1670, which was reprinted in the Year 1673; and as to the Deſcriptions much preferable to the former Edition, but not

as to the Figures. It bears this Title, *Spe-cilegium Anatomicum & Oſteogenia Fœtuum*, in which he deſcribes (tho' not very perfectly) what changes the *Fœtus* undergoes every Month, eſpecially in relation to the Bones from the *Ovum* to their full Structure and Maturity. He publiſhed in *Quarto* in the Year 1670 another Treatiſe called *Anthropogeniæ Ichnographia, ſeu Delineatio, deſcribens Hominis Geneſin ab Ovo fœcundato uſq; ad novem Menſem.* Theſe were moſt elegant Treatiſes in thoſe Days; for as he was very rich he expended vaſt Sums, and had the Aſſiſtance of the beſt Anatomiſts of *Amſterdam.* But as theſe Books are prodigiouſly ſcarce, you may find them in the *Bibliotheca Anatomica*, put out by *Manget* and *Le Clerque*; this Author is the firſt who ever undertook to write of theſe Matters.

2. *Malphigius* in his Poſthumous Work, *De Cornu Bovini Generatione & Concretione*, where he deſcribes how the *Papillæ* of the *Epidermis* may be compreſſed and conſolidated into a Bone. He found out this by obſerving that in the Neck of an Ox that had been uſed to the Yoke, there grew up a little Horn from the Nerves that lay under the Yoke, being firſt made cartilaginous and bony on the outſide. See his Epiſtle *ad Sponium*, and his Epiſtle *de Ovo incubato*,

incubato, wherein he gives ſome Touches of the Variation of the Bones in Chicken.

3. You muſt read the *Conceptus de Conceptu Humano* of *Char. Drelincourt*, this is an admirable Book, and printed at *Leyden* in *Duodecimo* in the Year 1685: But,

4. The chief and moſt excellent of all is *Joſ. Du Verney*, a Man incomparable in Anatomy. But it is great pity he would not preſent the World with his Diſcoveries; but his publick Dictates were curiouſly but not perfectly taken by his Scholars in the King's Garden at *Paris*, firſt by *Le Clerque* in *Oſteology* in his ſecond Tome, *de la Chirurgie complette*; but he obſerved that the *Os Scapulæ* was one while Cartilaginous, and then abſolutely bony and ſo on: Thus his Scholars carried always with them his Dictates, which indeed deſerve the higheſt Praiſe and Commendation.

SECT. II.

Oſteography.

I. AFTER therefore a Phyſician has learn'd how Bones are formed, he ought to know how they are framed and put together in adult Perſons. But that this may the better be done, he muſt take ſpecial Notice of the Diverſity between the Body of a Bone and what grows upon it. The Body of a Bone is a Series of Fibres which are extended into Rays (like thoſe of a Star) in its Formation, that which grows over it [or its *Adnata*] are the *Epiphyſes* or *Tubercula* which remain a long while Cartilaginous.

The Body of a Bone muſt be conſider'd two Ways,

1. *In reſpect of its ſolid Part.*
2. *In reſpect of its Cavity.*

In the former the *Perioſteum* about the Bone muſt be conſider'd, which is either *equal* or *inequal.*

An *equal Perioſteum* is when by the Texture of all the Veſſels falling or riſing within the *Meatus* of the Bone, either in relation to its Uſe, Growth and Marrow : The Arteries , Lymphatick Veſſels , Ducts of Fat, the Congeries and Texture of the Nerves go in and out : (For even in the Marrow there is Senſe) when it proceeds by one equal Series of Fibres, where there cannot be any Muſcle whatſoever.

A *Perioſteum* is ſaid to be *unequal,* when a Tendon or *Aponeuroſis* of a Muſcle lying near a *Perioſteum* penetrates that *Perioſteum*

rioſteum (where there is a two-fold *Perioſteum*) and inſerts it ſelf into the Bone: There have been ſome Diſputes in relation to the *Pericranium* and *Perioſteum*; for the *Pericranium* is the *Perioſteum* of the Scull, and the other is nothing but an Inſertion or *Aponeuroſis* of the Muſcles.

II. *J. Riolanus* in his *Anthropography* was the firſt who took Notice of this; but no one has done it with greater Exactneſs than *Havers* in his Lectures *De Oſſium Geneſi* in the Royal Society of *England*, and this has been of great Advantage to Mankind. He ſays the ſame thing in the twenty fourth Paragraph of the Subſtance of the Bones. In the Body of a Bone muſt be conſider'd its Subſtance properly ſo called, *viz.* that hard, dry, brittle, light Matter, void of all Veſſels which we call by the Name of a Bone.

A Bone in the Middle is firſt moſt ſolid, ſecondly moſt compact, and thirdly moſt united; but in the extream Parts, where the Joints are, and where it is knit to another Bone, the very Subſtance of the Bone is leſs ſolid, very porous, and conſiſting of many Spaces not ſo united: This is the Deſcription of a Bone in general as a Bone. I ſay nothing here of Veſſels. But how comes it to paſs that the *Os Femoris*,

moris, for Example, is moſt ſolid, compact, and heavy in the Middle? This Queſtion no one can anſwer but *Havers*, who ſhews that all the Bones were heretofore membranous *Strata*, mutually laid on each other, and compacted by the Pulſe of the Arteries, which at firſt is effected where the Arteries plentifully enter inſtead of the Marrow. Theſe are the Arteries of the *Perioſteum*, but about the Joints they are divided into leſſer Branches, and thence it comes to paſs that the Middle of the Bone is compacted in the higheſt Degree, becauſe there is the higheſt Pulſe; but in the Joints, where there is a lower Pulſe, the Bones are looſer.

The ſame Author obſerved, that if the whole *Os Femoris* was cleft through the Middle, where the Bone is thinneſt, the *Lamellæ* would be found there to be in as great a Number as in the extream Parts; but as the extream Part is thicker, the *Lamellæ* therein are more remote and expanded from each other, for the aforeſaid Cauſes. Hence it follows,

1. *That in the Middle of a Bone where the* Lamellæ *are moſt compact, the intercurrent Veſſels are the ſmalleſt; but in the extream Parts every thing is full of Veſſels (in the beginning of the Formation*

tion of a Bone it was quite contrary) as may be ſeen in Kerckringius ; *for in the extream Parts the Veſſels are not obliterated, and the* Lamellæ *are more remote.* Hence follows,

2. *The Whiteneſs of the Middle, and the Redneſs of the extream Parts. There is the greateſt Hardneſs in the Middle, and Softneſs in the extream Parts. But for what Uſe? It is evident from* Mechanicks, *that if you give any one a Stick to break, when the extream Parts are broken, it is eaſily broken in the Middle, becauſe in that Place there is a greater Violence of* Motion.
3. *There is ſcarce any Liquid between the* Lamellæ *and the innumerable fibrous Veſſels; burn them in the Fire, and you will ſee a great Quantity of Marrow fry out; and after that you will find ſeveral void Spaces between the* Lamellæ.
4. *When the Bones have no more Subſtance in the Middle than in the extream Parts, there muſt of neceſſity be left a Cavity in the Middle; about the Ends there are a great many very ſmall Cavities; but in the Middle there is one large common Cavity, where the Marrow ſhews it ſelf in greater Quantity, tho' it be alſo in the extream Parts between the little Receptacles*

ceptacles of the Fat. There is more Oil in the Middle but fewer Veſſels: On the contrary in the extream Parts there are more Veſſels and leſs Oil. By this you ſee the Reaſon why a Bone is eaſily broken in the Middle, and eaſily put together again; but it is not ſo eaſily broken about the Joints, but ground as it were, and much more difficult to be reſtored to its former Situation; for which reaſon Rottenneſs and Putrefaction is eaſily cured in the Middle by Raſure, but it is not ſo eaſy in the extream Parts.

III. Compare with this what I have ſaid in *Oſteogeny*, and you will have a clear and diſtinct Idea of a Bone; but in the ſolid Subſtance of a Bone, there are beſides intermediate bony kinds of Nails uniting the *Lamellæ* (after the ſame manner as Builders joyn two Walls together by Beams) that the Bones may not be cleft aſunder; ſo that in all Bones which are moved and ſuſtain the Body, there are thoſe Nails or little Beams, but not in them which only exerciſe Motion as thoſe in the Thighs and Shoulders. *Havers* ſays, that theſe kinds of Nails are in the whole Series of the Membranes, and the *Lamellæ* of the Sides which are inflected and depreſſed without keeping any Order at all.

IV. In the next place the Marrow muſt be conſider'd. All Bones which are deſigned for Motion have one Hollow or Cavity in the Middle, another about the Ends. The intermediate Cavity contains in every healthy, ſtrong, youthful, undiſturbed, well-fed Animal a very ſweet, pleaſant, thin kind of Oil, extreamly freſh, without the leaſt Mixture of Salt or Water.

V. From the *Perioſteum* through the Thickneſs of the *Lamellæ* are made oblique Holes, by which the great Arteries inſinuating themſelves from the *Perioſteum* ſoon diſcharge themſelves into the Cavity of the Bones, which, as ſoon as they have penetrated, they immediately apply their ſanguineous Branches on very Side to the Superficies of the Cavity, and make out of all the interwoven Branches a thick Membrane, which is the internal *Perioſteum* of the Bone, only covering the Cavity of the Bone. Take the *Os Femoris* of a Sheep, and cleave it long-ways in the Middle, there will ſtick to it in the inſide a ſanguineous Membrane, from which infinite Branches are diſperſed within the Cavity of the Bone, and by the intercurrent *Anoſtomoſes* make ſpherical Cavities which are made out of a certain Membrane interwoven with theſe Blood-Veſſels; theſe Membranes are hollow in the Middle, and receive the Oil of the Blood within their Cavities; there is a ſtrict Communication between theſe little Bags, and they gradually throw out again their Oil into the arterial Membrane, which is a Membrane very thin, covering the Marrow; hence it is call'd *Arachnoides*, that is a Collection of the excretory Ducts of the Oil of the Marrow. The Veins riſe out of theſe little Bags where the Arteries end, and receive the Blood without any of its Oil. Theſe Veins at the internal *Perioſteum* are interwoven with the Arteries, and go out thro' ſeveral Holes from the Arteries out of the Bone to the external *Perioſteum*, and thence to the *Vena Cava*.

But where is this Marrow? If you take a fat Horſe that has been well fed and died of a ſudden, his Bones will be full of Marrow; but if he had been uſed to hard Labour and then died, there will be no Marrow at all in his Bones, but *Serum* only in its room; by which it is evident that I may exhauſt all the Marrow out of the Bones by Motion. But if this Horſe had reſted ſome time in the Stable, he would have had his Bones again replete with Marrow.

VI. From hence this Oil is diſtributed into ſeveral Places,

1. It goes away by Sweating through the *Lamellæ* of the Bones. Take a Blade-Bone of a Shoulder of Mutton, cut off the Fleſh very clean, and hold it to the Fire, and you will ſee the melted Marrow ſweat through an infinity of little Holes or *Meatus*; cleave it then down in the Middle, take away all the Marrow with the Membrane, and hold it to the Fire, and even then you will find that the Marrow will diſtil. In boil'd Bones (as Shin-bones or Trotters) after the Fleſh has been ſome time taken off, you will ſee the Fat again ſweat out, and the Bones grow yellow; this Fat hinders the Bones from growing brittle, for the thickeſt Bone may be broken if burnt and its Oil conſumed by the Fire; but then if it be put into Water, it will grow firm again, but much more if into Oil after it has ſuck'd up ſome Quantity of Oil.

2. The ſecond Way it takes is towards the *Perioſteum*, thence to the larger Arteries, and then again at laſt to the Heart.

3. The third is greateſt of all, as being towards the Cavities of the Joints, to lubricate them, and to make their Motions without Crackling or Pain. If an Animal

undergoes much Motion this Oil is conſum'd, and there enſues a Difficulty of Motion, the Parts then grow hard thro' Defect of this Oil, as in the Wheels of a Mill, which unleſs they are well tallowed begin, as it were, to groan and at length by much Attrition are ſet on Fire. The Cauſe that brings this Marrow is the arterial Blood, the Places whence it is propelled are theſe *Sacculi* or little Bags, the propellent excretory Cauſe is every more forcible Motion of the Arteries. Therefore when an Animal is at Reſt, the *Oleum Medulloſum* encreaſes, if it undergoes much Motion the Blood is ſecreted through thoſe Parts I juſt now mentioned; thence it ſoftens by going thro' that Part which returns it into the Veins, and the Joints are moiſten'd for their reſpective Motions, *&c.*

VII. Authors who have excelled on this Subject are theſe, *viz.*

1. *Clopton Havers* in his new *Oſteology*, printed at *London* in *Octavo* in the Year 1695: After him,

2. *Du Verney*, of whom we know nothing but in his private Writings, ſome of which are to be ſeen in the *Journal des Sçavans*, and ſome publiſhed by his Pupils *Falſin* and *Le Clerque* in *Oſteologie*.

3. *Malphigius* has ſomewhat worthy your Notice in his *Poſthumous Works*, but he is not ſo excellent in this as in his other Treatiſes.

VIII. In almoſt all Bones towards the Extremities, and thence to their Sides grow other little Bones which are called by Anatomiſts *Epiphyſes*.

The Meaning of this Word [*Epiphyſis*] is as if one Bone grew over another: And all theſe are connected with the Body of the Bones by a kind of Joint. If you look carefully on a Shoulder of Mutton-Bone, you will find a Bunch or *Tuberculum* which may be eaſily ſeparated, which is called an *Epiphyſis*; and in that Part by which it is joined to the Bone, you will ſee Things like Teeth which receive and are mutually received by others. In the ſecond *Os Femoris* or Thigh-bone there are *Tubercula*, the greater and leſſer *Trochanter* at its Neck which are eaſily ſeparated and joined by the Cartilages or *Synchondroſis*, but in adult Perſons the Veſſels are ſo much compreſſed that you can only ſee one of them, and then it is called *Apophyſis*, or an innate *Appendix* to the Body of a Bone: All *Epiphyſes* in all Animals of Years change into *Apophyſes*.

IX. But for what End or Uſe are theſe *Epiphyſes* ſo cloſely connected with the Bone? There are ſeveral Opinions concerning this. Conſult *Realdus Columbus* in his Chapter *de Epiphyſibus*, and his Anatomy, wherein he ſays, that a Bone which is moved to a Bone is joined by Ligaments which knit one Bone to another, and that theſe are not made out of the *Perioſteum*, but between the *Epiphyſes* and the Body of the Bone there riſe out Fibres which embrace the *Epiphyſes* of the other Bone, and inſinuate themſelves between that and the Bone; but when the Animal is grown up, the continual Compreſſions make them *Apcphyſes*. Another Uſe is to knit the Tendons to the Bone: For where the ſtrong Tendons of a Muſcle are to be affixed, there grows up a *Tuberculum* or Bunch, that the Point of Direction of Motion may riſe out of ſuch Bone, and ſo the Muſcles from this *Appendix* have a much greater Power than if they were only in *plano Oſſis*.

X. Almoſt every *Epiphyſis* is covered with a Cartilage, for (as a Cartilage is a Thing moſt ſmooth and elaſtick) it ſooner reſults from Compreſſion, and the Bones are more eaſily moved about. Theſe Cartilages never become Bones or grow dry (as *Havers* obſerves)

ſerves) becauſe they have always with them a liquid, oily, marrowy Spirit, which makes them never come to be Bones, unleſs in a very old Age, becauſe then the interſperſed Liquid decays. In this Matter conſult *Columbus de Epiphyſibus.*

XI. All theſe Deſcriptions of the *Perioſteum* of the double Subſtance of the Bones, of the Marrow, *Apophyſes*, and *Epiphyſes* are true of all Bones; for Example, it is commonly ſaid that the Marrow of the Scull is the Brain, than which nothing is more falſe, and that the *Pericranium* is the outward *Perioſteum*, and the *Dura Mater* the inward. Theſe Bones are joined by pointed *Epiphyſes* which reciprocally indent each other; at firſt they were Cartilages after having been Membranes; and laſtly, in adult Perſons grow to be Bones; the *Sutures* are deſigned to give Iſſue to the Veſſels towards the *Perioſteum*; between the two *Lamellæ* of the *Cranium* is lodged its Marrow, called *Diploe*, which differs very much from the Marrow of all other Bones.

SECT. III.

Synoſteology.

I. AFTER this, let us conſider what is *Synoſteology Synoſteoſis* [Συνοϛέοσις] is a joyning of the Bones to each other in order to effect Motion. You muſt here then conſider the Nature of *Epiphyſes*, *Apophyſes* the *Tubercular* Heads of the Bones, the *Cotulæ* or Cups, then the cartilaginous Cruſtings or Coverings of the Heads and Cavities of the Bones, their Ligaments and ways of joining, and this Order I take is the true Order of explicating all theſe.

II. Every joining of a Bone is at its extreme Parts, which were firſt *Epiphyſes*, then *Apophyſes*, from whence ariſe Ligaments. Theſe therefore we ought firſt to learn; then their *Tubercula* and *Cotulæ*. Theſe *Cotulæ* Cups, or *Acetabula*, the Ancients ſaid were Hollows, in which one Bone was moved above another. The Structure of the Bones is certainly wonderful; for Example, the *Scapula* is plain, the *Caput Humeri* moſt round and ſmooth, and leſt it ſhould ſlip out there is placed over it a cartilaginous *Cotula*, ſhaped like a Bowl-Diſh, and by that means the *Tuber* cannot be moved above the

Bone, but is preſſed in by an elaſtick Subſtance.

III. The Ligaments have a great many little Glands which throw out a Juice in their Motion, as *Havers* obſerves.

IV. While one Bone is joined to another, if it has any Motion, it is called Articulation, which is various, *viz.*

1. By *Syſſarcoſis*, when one Bone is joined to another by Fleſh growing between them, as the *Scapula Coſtis*, but here is not properly an Articulation, for this Bone is only affixed to the Muſcles.

2. By *Syndeſmoſis*, or by Ligaments, neither is here a true Articulation; for Example, in the *Os Femoris* with the *Acetabulum* of the *Iſchium* or Hip-Bone.

3. By *Synchondroſis*, or by intermediate Cartilages, as the *Epiphyſes* of the Bones, *Os Pubis*, &c. But theſe three are not for moving the Bones, but joining them together.

V. But in this Place we muſt only conſider theſe Bones which are articulated for theſe ſeveral Motions following, *viz.*

1. *Flexion.*
2. *Extenſion*: And,
3. *Rotation.*

Every Bone deſigned for *Rotation* or turning about hath a protuberant Head, and is received into another Bone; thus I can turn about my Arm at the *Scapula*, and this Motion is call'd *Exarthroſis* or Inarticulation; thoſe which have Motion backwards and forwards, as for Example the Knees and Fingers, *&c.* have always two *Tubera* or Bunches, and this *Coarticulation* is call'd *Ginglymus*; the other ways of joining are all Spurious, as when a Bone is joined to another *Synarthroſis*; as for Example, the *Sutures*, that is, when a great many Teeth are received into as many Cavities. *Symphyſis* is when a Bone is ſimply as it were laid under another Bone, as the *Os Temporis*, and the *Os Bregmatis* (for here are alſo Teeth;) *Harmony* is when Bones are joined together by a right Line (but there is no ſuch thing in Nature) *Gomphyſis*, is when one Bone is faſtened (like Nails) into another, as the Teeth in the Jaw-bones.

The beſt Authors to be conſulted in this are,

1. *Veſſalius* in his firſt Book in *Folio*, this Author is abſolutely the beſt of any.

2. *Columbus* and *Fallopius*.

3. *Le Clerque* is moſt excellent in his *Oſteology*.

4. *Riolanus.*
5. *Philippus Ingraſſius :* And,
6. *Havers*, who treats of the moſt minute Particulars in this Part of Anatomy.

VI. Since now I have ſhewn you every thing that relates to a Bone, and given you a Liſt of the beſt Authors thereupon, I ſhall now preſent you with ſome Thing very new.

It has been obſerved that from the extreme Parts of every Bone, between the outermoſt or ultimate Joints and the ſlippery cartilaginous Parts, there flows a Liquid which is neither watry, oily, ſpiritous, nor merely glutinous, but is moſt clear and tranſparent as you ſtretch it out between your Fingers. This is always at the Joints in all Animals whatſoever, and when this Liquid fails, then the Bones have been obſerved to crackle, and can ſcarce be moved, as it happens, for Example, in the *Lues Gallica*, and the Scurvy ; the firſt who diſcover'd this Liquid was *Havers.*

VII. The Joinings of the Bones together are of two Species.

1. For Example, the *Os Femoris* is joined to other Bones, not herein mentioned, by the Cup, *Cotula* or *Acetabulum :* In the

Middle of whoſe Cavity is another Cavity, whence riſes a fine ſmooth Ligament, which faſtens the Bone to the Middle of the Cavity; within this there are a great many little Glands, which being compreſſed, emit a Liquid ſomewhat unctuous, but not directly oily; this Liquid thus expreſſed mingles with the Oil of the Marrow of the Bones, which when the Part is moved ſweats out and meets with it; and theſe two being thus mingled, make that ſlippery Matter which preſerves the Bones from being worn away by growing dry.

2. The Bones are ſo joined together that the Cup and the Head therein received may touch one another on every Side, and in theſe there is no ſuch *Sinus*; but then the Ligaments have theſe little Glands, which being preſs'd emit that Liquid: Theſe are called the *Mucous Glands*, whoſe Effects are theſe four following;

1. *To ſeparate this* Mucus, *or tranſparent* Viſcid *and inſipid Liquor, which, when the Bones are moved, falls into their Cavities.*
2. *To mingle it with the diſtilling* Liquid *of the Marrow.*
3. *With the* Marrow *to form a third Body, which is neither oily, nor merely marrowy.*

4. *By this Means and by the Motion of the Bones, this* Liquid *is made by Degrees moſt thin and ſubtile. For it muſt of neceſſity be ſo, that it may be thrown back again by the abſorbent Veſſels and mingled with the Blood. For if it ſhould grow thick there would be a Dropſy in the Joint.*

We owe a great deal to the *Genius* of this excellent Perſon [*Havers*] for having made his Obſervations on a Matter 'till then unknown to every Body. You may ſee his Writings in the *Philoſophical Tranſactions* of *London*, or in his new *Oſteology.*

VIII. The principal Authors in *Oſteology* are,

1. *Andrew Veſalius*, a Native of *Bruſſels*, and an Anatomiſt, whoſe Books, *De Corporis Humani Fabrica* can never be ſufficiently commended. His Works were printed in *Folio* at *Baſil* in the Year 1545, 3 but ſoon after ſpread over all *Europe* ; and then again printed at *Baſil* in 1555. The Figures of the firſt Edition are the moſt beautiful ; the Figures of the ſecond Edition are more obſcure and blotted, but the Text makes Amends for all ; for he out-lived the firſt Edition, and corrected its Faults, and made new Additions, exa-

mined all Objections that might be made thereto: If you would have him compleat, you muſt take the two Editions together.

In his firſt Book he deſerves our higheſt Eſteem in Relation to what he wrote of Bones.

2. *John Riolanus* the Son, this Author was a *Pariſian*; the beſt Edition of his Anatomical Works is that of *Paris*, printed in *Folio* in the Year 1650. None of you if you are wiſe will be without this Book; for by his Method you will beſt of all perform your Studies. He was a perfect *Galeniſt*; but at laſt yielded to *Harvey*. He wrote againſt *Harvey*, but being convinced, he publiſhed this Book. You may read his Treatiſes of Bones. He however would explain every thing according to *Galen's* Way, and always conſulted his way of Writing; he has no Figures. If you would have more than *Veſalius* wrote, you muſt compare this Author with *Veſalius's* Figures; for whatever has been newly diſcover'd ſince *Veſalius* you find here.

3. *Realdus Columbus*. He was *Veſalius's* Scholar (for *Veſalius* was a Profeſſor.) This Author was a *Cremonian*, he has no Figures. This Work is printed in ~~Thirteen~~ Books
fteen in *Folio* at *Venice* in the Year 1559; or you may have them in *Octavo* printed by *Weckel*.

4. *John Philipp de Garcias*, who wrote a Commentary on *Galen* of *Bones*. This was printed in *Folio* in *Sicily* in the Year 1603, and afterwards at *Venice* in 1604. There never was any one more curious in collecting what he could than this Author; but he is very ſcarce, and there is no great Hopes of finding him, but buy him if you can, but do not give too much Money for him; for *Riolanus* has collected out of him the Things that are the moſt excellent and material.

5. Add to theſe a little Book of *Le Clerque*, the late King of *France*'s Phyſician, called *Oſteologie Complete*, printed at *Paris* in *Octavo* in the Year 1706; there is no one can be more ſerviceable, in a ſhort Method, to any one's Memory who knows any thing than this Author. It is a moſt incomparable Book; it has in it two Things very particular.

1. *He moſt accurately deſcribes all the new Diſcoveries of Authors.*
2. *He moſt perfectly delineates where the* Aponeuroſes *of the Muſcles unfold themſelves upon the Tendons.*

Read this Author over and over; for he will ſerve you as an *Index* in reading others.

6. *John Palſin.* This Book is publiſhed

in *Flemiſh* at *Leyden*; it moſt compendiouſly contains all *Du Verney*: But,

7. And more eſpecially you muſt have recourſe to *Clopton Havers* in his new *Oſteology* printed in *Engliſh* in *Octavo* at *London* in the Year 1695; the *Latin* Tranſlation is good for nothing, the Tranſlator in many Places having varied from the Senſe of the Author.

IX. If you read theſe Books you will acquire a more perfect Idea of *Oſteology* than any Author ever yet had; and thus in the Space of two Months you may learn it by coming two Hours twice a Week to our Anatomy Theatre, [School] where are a great many Skeletons.

* * *

CHAP. II.

The Second Part of Anatomy.

Myology.

I. ACcording to Order, our future Phyſician ſhould learn every thing which belongs to the Muſcles, which Part of Anatomy is called *Myology* from Μȣ͂ς, a Mouſe, (or Lizard) by which Name the Ancients not improperly called a Muſcle, on Account of the Figure and Shape of that little Animal; and they divided it into three Parts, *viz.*

1. *The* Head *or* Origin *where there is an obtuſe Tendon.*
2. *The* Belly *where the Muſcle is fleſhy in the higheſt Degree :* And,
3. *The* Tail *where it ends in a Tendon more acute.*

II. *Myology* is divided into two Parts, *viz.*

1. Into *Myography*, which deſcribes every thing that belongs to a Muſcle. And,
2. Into *Myotomy*, or the Deſcription how a dead Body ought to be treated in order to make the Muſcles viſible and conſpicuous.

Which two Parts I ſhall conſider in the two following Sections.

SECT. I.

The firſt Part of Myology, viz. Myography.

MYography is divided into three Parts, of all which in their Order.

I. The firſt Part of *Myography* teaches the Matter of which the Muſcles are compoſed,

poſed, which is Arteries, Veins, Nerves, Lymphatick Veſſels, Tendons, Fat, with their reſpective Veſſels, and laſtly Membranes.

The Arteries in the Muſcles are divided into Blood-Arteries, Lymphatick Arteries, and (perhaps) Spirituous Arteries; for in all Places there is an Artery which throws Blood into the Veins, and ends in a Lymphatick Artery and Lymphatick Vein; and perhaps, as in the Brain there is ſecreted ſome minute Part, ſo as at the outermoſt Veſſels may be a little Tube to carry a ſpirituous Liquid; the *Arteria adferens* is called *Arteria Spirituoſa*, and the *Vena referens* in like manner, *Vena Spirituoſa.* All theſe Veſſels being folded and retorted on each other make the *Reticula* in a Muſcle.

There come alſo Nerves to every Muſcle, as likewiſe the *Vaſa Pinguedinis*, which are placed between the fleſhy Fibres of the Muſcles in ſuch manner, that the Marrow between the *Lamellæ* of the Bones and the uſe of that Fat is the ſame with the Marrow, to wit, to ſmear the Heads of the Muſcles with the expreſſed Liquid, and defend them from Attrition; the Membranes alſo are made out of the *reticular* Folds of the Veſſels, and the outermoſt *rectilineal* Veſſels.

Authors that have treated on this Subject, *viz.* the Structure of the Muſcles, and which you muſt have recourſe to, are,

1. *Lower* of the Heart, who was the firſt that gave us the firſt Idea of the Muſcular Structure, that is, that by this Means every little Fibre ended in a Tendinous Vein.

2. *Cowper*, who publiſhed a Book in *Engliſh*, printed at *London* in 8*vo.* in the Year 1692, and has a great many things in his Preface relating to the Structure of the Muſcles.

3. *Ridley*, who has written a Chapter in his Anatomy of the Brain, in which are many things relating to the Action of the Muſcles: Theſe are the principal Authors I would recommend to you to inform you in the Hiſtory of the Parts which the Muſcles are compoſed of.

II. The Second Part of *Myography* treats of the fixing of the Muſcles to the firm Baſes, and to the Parts that muſt be moved. Every Muſcle, except the Heart, is made to move one ſolid Part towards another; while therefore a Muſcle moves, it has one Part fixed, which is called its Baſis, and another to be moved toward this Baſis which is ſaid to be moved; they are likewiſe called fixed and moveable Points. The Parts of the Muſcles which are thus joyned, to wit, the Head and Tail *Galen* called Απονέυρεσις for ῎ονευρον. ſignifies a Nerve, and the Ancients thought it was a Nerve that made this Tendon at the Muſcles, which afterwards was demonſtrated to be falſe by *Steno* and others. No Part muſt be more accurately learned than this, for to know the Places where the Tendons are incerted is very uſeful both in *Phiſiology* and *Surgery.*

Authors in this Part are,

1. *Andrew Veſalius*, than whom no one ſince *Galen* wrote more accurately, and no one's Figures are more expreſſed to the Life, as may be ſeen in his ſecond Book which treats of the Muſcles. His Fault however is, that he has inſerted a great many Dogs Muſcles inſtead of thoſe of Men; for Example, the Muſcles that bow the Neck which are not in Men; he has beſides three or four other Miſtakes, but his Deſcriptions are moſt exact, tho' digeſted in a very difficult Manner; his Method is ſuch as no one can poſſibly remember; for he gives Names only as they occur in their Order, which is a great Inconveniency.

2. *Gabriel Fallopius*, who for beautiful Diſſection is much preferable to *Veſalius*; for no one ever reaſoned more accurately

in relation to the Functions and Offices of the Parts. He publiſhed three *Tomes* in one Volume in *Folio* at *Venice* in the Year 1584, which Edition is ſcarce; it was afterwards reprinted in the ſame Place in 1606, which alſo is become very ſcarce; and laſtly at *Frankfort*. There was a new Edition printed by *Weckel* in the ſame Year 1606, with an *Appendix*, which Edition is the beſt: He wrote Obſervations on *Veſalius*. The *Inſtitutiones Anatomicæ* are of no Value; but perhaps they are not this Authors. What is wanting and miſtaken in *Veſalius* this Author has ſupplied and amended; however this Work does not much help the Memory, becauſe his Method is no better than that of *Veſalius*.

3. *John Riolanus* the ~~Father, in~~ his *Anthropographia* printed at *Paris* in *Folio* in the Year 1650; this Work contains five Books which any Body may ſafely rely upon. Before he publiſhed his Works he had diſſected above a hundred Bodies; and ſeeing that his Scholars could not retain the Names as mentioned in *Veſalius*, he therefore gave new Names, taken either from the Function or the fixed Point of the Muſcles. Theſe Names are admirably well adapted and eaſily retained, the Point to which a Muſcle is fixed being known from *Oſteology*; and,

4. *Jacobus Sylvius*; but *Riolanus* is ſo perfect, that if you only conſult him, you need deſire no other, tho'

5. *Le Clerque* ſeems much better to have deſcribed the Places of the Muſcles in his *Chirurgie Complete* in two Vol. in *Octavo*, and in his *Oſteologie* in two Vol.

III. The third Part of *Myography*, teaches the Uſes or Effects of the Muſcles; for which read,

1. *Lower*, *De Cordis Muſculo*; but of the Muſcles in general, read

2. *Veſalius.*

3. *Fallopius.*

4. *Riolanus.*

5. *Le Clerque*; and,

6. *Cowper*, which laſt has many excellent Obſervations in his reformed *Myotomy* in relation to the Diſcoveries of the four immediately foregoing Authors; as for Example, the aſcending Muſcle of the *Abdomen* is uſed for Compreſſion, and he demonſtrates that by this Muſcle the Body can be moved at the Sides, and the Ribs wreath'd about; beſides many other curious Obſervations. To theſe add,

7. *Borellus De Motu Animalium.* None of you ought to be without this Author; he was not, it's true, an Anatomiſt, but at the time that the beſt Anatomiſts in the

World, *Steno*, *Vieuſſens*, *Malphigius*, &c. met together at *Piſa* in *Tuſcany*, he was preſent, and they every one of them gave him all their Diſcoveries and Demonſtrations, which were the Foundations he built upon.

SECT. II.

Of the ſecond Part of Myology, *viz.* Myotomy.

I. IF you would thoroughly be acquainted with the Art of *Myotomy*, conſult theſe Authors who have written thereupon, *viz.*

1. *Veſalius* wrote ſo admirably well on this Subjects that even *Riolanus*, who was his Enemy, could not help but commend him. Where, for Example, he deſcribes the Muſcles of the *Abdomen*, he ſays, that any one who would begin the Diſſection of a Body ſhould do it in ſuch and ſuch a manner, *&c.*

2. *Riolanus*, but the beſt of any is,

3. *Cowper*, who will prove of the greateſt Uſe and Advantage to any one that deſires to be perfect in Anatomy.

4. *Michael Lyſerus*, in his *Culter Anatomicus* printed in the Year 1653, and reprinted in 1665; and laſtly at *Frank-* Lyſe

fort in 1679, which is the beſt Edition, *Bartholin* having made ſome Additions thereto; this Perſon in his Youth apply'd himſelf entirely to this Work, and the whole Book is nothing elſe but how to teach us the beſt Method of Diſſection.

II. But for learning this Part by Figures, in Caſe you cannot be where a dead Body is diſſecting; and becauſe 'tis impoſſible the Memory ſhould retain ſo many Things (tho' the beſt Anatomiſts, and eſpecially *Riolanus*, would by no means publiſh their Works with Figures, leſt the Art ſhould grow too eaſy:) Conſult,

1. *Veſalius* in his Work *De Muſculis.*

2. *Spigelius*, of the *Amſterdam* Edition by *B'aauw* in the Year 1645 in *Folio.*

3. The Royal Chart [*Charta Regia*] engraven by *Vander Linden*, where you may ſee all the Figures; or *Caſſenius* of *Placentia*, as publiſhed by *Boncretius*, *Spigelius*: Thoſe of *Godfrey Bidloo*, publiſhed at *Amſterdam* in the Year 1685, but the beſt Impreſſion is that of *London* in 1698; the Deſcriptions are not worth much. This Work which is entirely owing to *Bidloo* appears under *Cowper*'s Name; but this Edition to which *Cowper* added an *Appendix*, and many Letters omitted in the Figures of *Bidloo*'s Book, with curious Obſervations on the

hurted Parts, is much preferable to all others, but can ſcarce be bought for a hundred Guilders

CHAP. III.

The third Part of Anatomy.

Splanchnology.

I. HAVING had a competent Knowledge of what hitherto I have been treating of, Order obliges us to apply our ſelves to the Knowledge of the *Viſcera* or Bowels, which Science is called 'Εντερολογία from Ἔντερον *Viſcus* and Σπλαγχνολογία from Σπλάγχνον, which ſignifies the ſame thing. But is it not better one ſhould be firſt acquainted with ['Αγγειολογία] *Angiology?* But who is there do you think will deſcribe what *Arteria Pulmonalis*, for Example, is before he has deſcribed what *Pulmo* is?

II. By the Name of *Viſcera* or Bowels is to be underſtood a larger Kind of Machine conſiſting of Veſſels the moſt different from each other; by the Effect of which the

Humours are changed for the Benefit and Advantage of the whole Body. Thus the *Spleen*, for Example, the *Liver*,&c. are truly *Viſcera*, that they may by this Name be diſtinguiſhed from the Glands, Bones, *&c.*

III. *The Heart* is wont to be called the Principal or Chief of the *Viſcera*, but this is very improper, the Heart being a Muſcle, ſo that its Structure is to be learn'd from thoſe who have written of *Myography*. Read therefore theſe three Authors following, *viz.*

1. *Lower* in his Treatiſe *De Corde*, in which he deſcribes its Coverings, Appendices, annexed Veſſels, and its very Subſtance, in ſuch manner as no one before him ever did. By reading this one Author may be known what all others have written hereupon; but yet he omitted ſeveral Things which are treated of,

2. By *Raymund Vieuſſens* in his *Obſervationes de Cordis Structura interiori vaſiſque non ita pridem detectis* in *Folio:* In the ſame Book he treats of the Brain; but beſides theſe he wrote many Things *De mixtis Principiis* in *Quarto*, printed at *Lyons* in the Year 1688. From *Pag.* 79 to *Pag.* 120, he is taken up in deſcribing the Heart. In this Author there are moſt beautiful Obſervations of the running down of the Fibres to

the Bottom of the Heart. [He propoſed ſeveral Opinions in relation to the Aliment of the Heart which do not pleaſe, but this is nothing to Anatomy.] There you will ſee that from the *coronary* Artery there is impelled a Liquid, not only into the *coronary* Veins, but is injected thro' the Arteries: That it diſtils thro' into the Cavities of the Heart and its *Auriculæ* by certain ſingular Ducts. That the Heart while it contracts its ſelf throws out the Blood into the *coronary* Artery which returns thence thro' the Veins into the right *Auricula*. But by theſe Obſervations it appears that the Blood is carried out of the *coronary* Veins into the Heart two ways, to wit, the greateſt and chief of all is through the *coronary* Veins; and that ſomething likewiſe tranſfuſes it ſelf thence into the very Subſtance of the Heart. This two-fold Circulation through the Heart is undeniable. This has been evidently made out by *Thebeſius* in his *Theſes* or Concluſions when he took his Doctor's Cap about three Years ſince in this our Univerſity. *Vieuſſens* thought the Blood that tranſmitted it ſelf from the *coronary* Veins into the Cavity of the Heart was the Cauſe of Fermentation in the reſt of the Blood, but he proves this by no Experiment. His anatomical Obſervations however are very good. Beſides theſe Authors who have written of the Heart, there is ſcarce any worth your peruſal except,

3. *Frederick Ruyſchius*, whom you muſt conſult in his Obſervations and Figures, as alſo in the very Veſſels of the Heart, which he ſhews to every one with a great deal of Humanity and good Humour. That you may the better know the Veſſels of the Heart, he boils it, takes away the Fat, then hangs it up in Water, which he renews every Day for ſome Weeks, and by this means extricates the Fibres, and the whole becomes a Ball of Veſſels.

From theſe three celebrated Authors you have every thing that may principally be conſider'd in relation to the Heart. I cannot reckon the Heart among the *Viſcera*, becauſe it only moves, not changes the Blood.

SECT. I.

Of the Brain.

1. AS the *Viſcera* are reſtringent Things, in which Liquids are changed to do ſome certain Office, the Brain undoubtedly muſt in the plaineſt Senſe be reckoned one of them. Now that a Student may diſtinctly know all Things that relate to

the Brain, it is neceſſary firſt that he know what the Brain is. By the Brain then I underſtand all that Maſs within the Circumference of the *Cranium* and the *Vertebræ*, and in this Senſe I always uſe this Word, unleſs it be when I uſe it in oppoſition to the *Cerebellum*. And which (to omit the ambiguous Term 'Εγκέφαλος) is the moſt convenient of any, as expreſſive of every thing contained in the *Cranium*, and in a larger Senſe ſignifies all its *Appendices* which fall down to the *Os Coccygis*.

II. That the Fabrick of the Brain may be exactly conceived, we muſt have a true Notion of the *Cranium* and *Vertebræ*, both the *Memiges*, the Brain and *Cerebellum*, the *Cortex*, and the collected Marrow of both; the *Spinal* Marrow, the Egreſs of the Nerves and their Diſtribution. None of theſe muſt be omitted if you would have an accurate Knowledge of the Brain.

The Authors to be diligently and carefully read upon this Subject are,

1. *Le Clerque* in his *Oſteology*. This Author treats with the greateſt Accuracy of all Things which belong to the Brain, and what happens to it in the Scull and *Vertebræ* in the leaſt Mutation whatſoever. And thus muſt you prepare your ſelf for three or four Days before you come to ſtudy the

Brain it ſelf. This Author is ſufficient unleſs you have a mind to add to him;

2. *John Palfin* (whoſe Book is in *Flemiſh*) in what he ſpeaks of in relation to the Brain and *Vertebræ*.

3. *Willis* in his *Anatome Cerebri*, eſpecially, if you can get the *London* Edition 1670, which is much more copious than the former Edition in 1664. There is no Book more beautiful than this. The Figures are ſo exact as if they were the very Body it ſelf; which is owing to Sir *Chriſtopher Wren*, that compleat Mathematician, who was preſent at the Diſſections of *Lower* and *Willis*, and deſigned them with his own Hand. The other Editions in *Dutch* and *French* are ſo alter'd that the Figures are ſcarce worth looking at. In the firſt Part he gives you the Anatomy of the Brain; in the ſecond the Deſcription and Uſe of the Nerves.

4. *Raymund Vieuſſens* in his *Neurographia Univerſali* in *Folio*, printed at *Lyons* in the Year 1685; you ought rather to buy this Edition than that put out ſince, tho' it be three times dearer. For the Author compiled this when he was preſent at the Diſſections in the Hoſpital of *Montpelier*; and it is a general Rule that ſuch Editions are always amended by the Authors: Otherwiſe they frequently come out faulty

and incorrect. After you have read theſe you cannot be without,

5. *Ridley*'s Anatomy of the Brain printed at *London* in *Octavo* in the Year 1695.

III. I cannot give you better Advice than carefully to read theſe Authors; for the Figures are ſo beautiful and lively as if you ſaw the very Bodies themſelves. For Order in Writing *Willis* is certainly preferable to the reſt. *Vieuſſens* added ſome Things to him, *viz.* that the Blood returning from the Brain is not only carried into five *Sinus* or Cavities, but that the *Baſis* of the *Brain* is ſo rough as to admit ſo many Cavities to receive the Blood as his Figures repreſent; he has likewiſe ſeveral fine Things in relation to the muſcular Fibres of the *Dura Mater*. And beſides, his Figures ſhew the Brain every way diſſected, ſo that they alone will teach you that it is impoſſible you ſhould miſtake. *Willis* only ſhews it you whole and entire; but *Vieuſſens* diſſected it in Length and Breadth, Horizontally and Side-ways, and thereby has given us ſo clear and diſtinct Idea of it that we need not look any farther: And he always added ſomewhat to *Willis*. *Lower* having been thoroughly acquainted with theſe new Obſervations, made ſome curious Additions relating to the muſcular Fibres of the *Dura Mater*, the Lymphatick Veſſels *in Plexu Choroideo, & de Plexibus Ductuum cera repletorum.* Which no one ever diſcovered before him.

IV. From theſe Authors you may learn,

1. *All things relating to the* Cranium, Meniges, Arteries, Veins, Nerves, Lymphatick Veſſels, *and* Cavities *or* Sinus.
2. *What relates to the* Apparatus *of the Blood-Veſſels, both without and within the* Cranium, *which* Ridley *has moſt elegantly deſcribed, as alſo what belongs to the* Enclomæ *of the* Vertebræ, *which you may find admirably well explained in* Willis.
3. *You will learn the Deſcription of the Situation, Bulk, Figure of Parts, their Diſtribution; of the Cavity of the Appendices, the* Cortex *of the oblong Spinal* Marrow, *and of the Brain and* Cerebellum, *as alſo the Egreſs of the Nerves, and what wonderful Things they thence infer. Conſult* Willis *and* Ridley, *why the upper Parts are ſmooth, and the lower rough? To what End ſerves the Comb or Creſt of a Cock and the* Sella Turcica? *In what Cavity are the four Eminences? Why the whole Baſis*

Baſis or Bottom of the Brain is as rough and jagged as broken Rocks? Why the Os Baſiliare *is every way rough? This we ſhall be entirely ignorant of, unleſs we know it from theſe three Authors; for the Weight of the Brain would have compreſſed the Veſſels, were they not placed in thoſe* Sinus *or Cavities. For which reaſon the* Dura Mater *is extended like a Curtain, that it may not preſs upon that Body, which is no where more tender than where the* Carotides *enter, otherwiſe if it was not held up by the* Dura Mater, *it would fall down upon the* Carotides.

4. *In theſe Authors you will have excellent Comments on the abovementioned Particulars, without which you will know nothing of the Brain and its Functions. Theſe Authors, tho' you read them ten times over, will always afford you Delight and Pleaſure.*

V. After reading theſe, as ſoon as our Student has impreſſed in his Underſtanding the Species of this *Apparatus*, it will be time for him to add thereto the Knowledge of the Structure of the Subſtance of the Brain. Theſe three foregoing Authors only teach us its inward, and nothing of its outward Structure: To them therefore muſt be added,

1. *Frederick Ruyſchius* in his *Obſervationes Sparſæ Anatomicæ & Chirurgicæ*; but eſpecially in his *Theſauri*, where are here and there ſcatter'd ſeveral Figures of the Membrane and *Cortex* of the Brain.

2. The chief of all, and which no one ought to be without, is *Marcellus Malphigius* in his firſt and ſecond Treatiſe *De Cerebro*: In the firſt he treats of the Nature of the Glandules; in the ſecond of the Nature of the nervous *Fiſtulæ* or Tubes; then you will with good Judgment ſee what is to be thought of the *Cortex* and *Medulla* of the Brain; that is, the *Cortex* according to *Malphigius* are Veſſels rolled up together in the Form of Glandules or a Subſtance not glandulous, but merely vaſculous, and that the *Medulla* or Marrow is compoſed of nervous Pipes or Tubes. And thus will you have an entire, diſtinct, and perfect Notion or Idea of all what I know in relation to this Study of the Brain.

VI. Whoſoever has perfectly conquer'd the foregoing Articles, muſt then apply himſelf to acquire the Knowledge of the Nerves, their Subſtance and Origin, their Egreſs from the Brain, their Diſtribution within the *Cranium*, and the Repoſitory or *Theca* of the *Vertebræ*; their Egreſs from the *Cranium* or *Sutures* of the *Vertebræ*;

their Diſtribution through the Muſcles, *Viſcera*, and ſenſible Places.

VII. If you have a Mind methodically to learn and retain all theſe, you muſt firſt make your ſelf acquainted with the Subſtance of the Brain, which is the very *Medulla* or Marrow of the Brain, the *Cerebellum*, and Spinal Marrow, which in its Origin is every where equally ſoft, but when it comes to iſſue without the Brain it acquires an aſcititious Membrane, *viz*. the *Pia Mater* for its Covering, by which it is made harder; but when it comes to the Muſcles, *Viſcera*, and ſenſible Organs, then it lays by its outward Tunicle (produced by the *Dura Mater*) and being covered only with one Tunicle proceeds to the Places of its Function, where it lays aſide this *Pia Mater*, and becomes like *Mucus*: (Thus the Olfactory Nerve is ſo mucous and of ſuch Tenuity, that if the leaſt Atom of Duſt fall upon it, it makes us ſneeze; and thus in the Eye the *Dura Mater* of the Optick Nerve makes the *Scherotick* and the *Pia Mater* the *Chorcideal* Tunicle, and the Nerve it ſelf is made into that Mucous *Retina*.) Laſtly, under the *Epidermis* lies the marrowy mucous Body of *Malphigius* unfolded from its Tunicles, for receiving Senſation; but the other Nerves which only ſerve for Motion do not ſeem to loſe the *Pia Mater*, perhaps they return again towards the Brain, being covered with their *Memiges*. Their Origin is always in the *Medulla* or Marrow of the Brain and its ſeveral Parts.

VIII. Of their Diſtribution, Separation, Recourſe, Determination at the *Viſcera*, read,

1. *Willis*'s Anatomy of the Brain. This is the beſt Treatiſe of Anatomy that ever was publiſhed, to which is added a new Deſcription of the Nerves and their Diſtribution in this or that Part; their Origin, Coition, and End is moſt excellently deſcribed by him, ſo that neither *Galen*, nor *Sylvius*, who boaſted ſo much of their Tables, are in any wiſe to be compared to him. This Treatiſe is abſolutely the beſt of any to teach one the Nature of the Nerves that go out from the *Cranium*, which ſerve the external Senſes, the *Viſcera* (theſe are called *Splanchnici*;) and the few Muſcles of the Head and Neck. You need look no farther than *Willis*, and he was moſt excellent in theſe Matters. But if you would know the Nerves which deſcend to all the Muſcles of the Body, then this Treatiſe of *Willis* muſt be amplified and corrected by,

2. The *Neurologia* of *Raymund Vieuſſens* in *Folio*, where with prodigious Labour, and tedious Diſſection, he diſcovered, painted and deſcribed the Nerves as every one of them are carried from the Spinal Marrow to every Muſcle; for as he was enquiring only into the *Subcutaneous* Nerves, he ſaw he could not make this Inquiſition without examining into all the Nerves of the inferior Muſcles, and he has this Honour given him by all Anatomiſts, that his Figures are as exact as what they repreſent in dead Bodies.

So then *Willis* is the beſt that ever wrote of the Nerves of the external Senſes; but here *Vieuſſens* muſt be called in to his Aſſiſtance, and from theſe two Authors you may learn every thing relating to this Subject in a very ſhort and compendious Manner.

SECT. II.

Of the Structure of the JAWS.

AFTER the Nature of Nerves has been carefully examined into as being Products of the Brain, the *Jaws* follow to be conſider'd, which deſerve to be number'd amongſt the *Viſcera*, becauſe they receive ſomewhat to be changed or alter'd. The *Jaws* are defined to be the

Veil or Covering of the pendulous Palate: (For the Palate is two-fold, the foremoſt which is bony, and cover'd with a rough Membrane, the hinder is an expanded Veil or Covering capable of being drawn up and down) in the Middle of the *Uvula*, and at its Sides the *Tonſillæ*. This Part is explained by *Fallopius* in the Deſcription of his four Muſcles, and by *Veſalva*. Read therefore,

1. *Veſalva*'s Treatiſes *de Pharynge de Muſculis Pterigoſtaphilinis*, *Salpingoſtaphilinis*, &c.

2. *Conrad Schneider* in his Treatiſe *de Catarrhis*, printed at *Wittenberg* in the Year 1660, this Edition held only one Year; for in the following Years 1661, and 1662, there were added to it ſeveral new Treatiſes full of curious Learning. This Author diſcover'd that all that whole Membrane which covers the Jaws, Palate, and *Oeſophagus* was a common glandulous Membrane which ſeparates the Liquid to moiſten thoſe Parts. He likewiſe deſcribed all the Diſtempers that infect them; but it abounds with two much Erudition, for what he has filled a whole Book in *Quarto*, may be contained in two Sheets of Paper.

SECT. III.

Of the Lungs.

IF any one would know exactly what the *Lungs* are, let him (to proceed in Order) begin from the *Larynx*, which is the wonderfully compoſed little Head of the *Aſpera Arteria*, and compoſed of ſo many Muſcles, that in the whole Body there is no Part ſo noble. Of its Cartilages and Muſcles read,

1. *Julius Caſſerius*'s Treatiſe *de Vocis Organo* in *Folio* with moſt excellent Figures and learned Deſcriptions. He not only ſearched into and examined its Form and Fabrick in Human Bodies, but in Birds, four-footed Beaſts, Frogs, *&c.* It is an incomparable Treatiſe, the *Italian* Edition of *Padua* is only valuable; in others the Figures are miſerable. This Author was a Native of *Placentia*. Add to him,

2. The new Obſervations in the laſt *Tome*, and the laſt but one of the *Monumentum Pariſinum*, where *De la Hire*, a famous Anatomiſt, demonſtrates that the Muſcles opening and ſhutting the *Glottis* are not Fleſh but white Ligaments.

But of the Arteries, of the Lungs, their Veins, Lymphaticks, Nerves, *Veſiculæ Bron-*

chiales, the Foldings and *Interſtices* of the Veſſels: Read,

3. *Tho. Bartholin De Pulmonis Structura* printed in *Octavo* in the Year 1663: Or, if you cannot buy that, the *Leyden* Edition in *Duodecimo*, printed in 1672. He admirably well proſecuted what other Authors wrote concerning the Lungs. Add to him,

4. *Malphigius*'s two Epiſtles *De Pulmone*. It is pity that the *Engliſh* have omitted in their Edition three or four Plates which are in our *Leyden* Edition. I know of no other Author can be added, unleſs it be,

5. *Ruyſchius* for his Treatiſe *De Bronchiali Arteria*, and you muſt make this Obſervation, that the *Bronchial Veins* riſe out of the *Bronchial* Artery, which do not diſcharge themſelves into the Cavity of the Heart, but into the Vein Ἄζυγον, whence the Blood comes at the right Cavity of the Heart, and this was the Obſervation of the famous Anatomiſt *Ravius*.

SECT. IV.

Of the Ventricle and Inteſtines.

OF the Ventricle and Inteſtines and all Things thereto belonging theſe Authors following muſt be ſtudied, *viz.*

1. *Gliſſon* in his Treatiſe *De Ventriculo & Inteſtinis*, printed in *Quarto* at *London* in the Year 1677, which Edition is infinitely preferable to any other. This Author was moſt exact in that Treatiſe; he deſcribed in good Order, and in an excellent ſmooth Style every thing that was known in his Time relating to the *Oeſophagus* the Ventricle and Inteſtines, adding nothing that was foreign to his Purpoſe.

2. *John Conrad Pyerus*, an excellent Phyſician and Anatomiſt: (It was pity multiplicity of Buſineſs forced him to leave off this Subject.) He wrote an *Anatomico-Medical* Treatiſe *De Glandulis Inteſtinorum*. You may ſafely rely on his Writings. The Edition of *Scharf* in *Switzerland* in *Octavo* printed in the Year 1667 can ſcarce be purchaſed for Money; but in his *Parerga Anatomica* there are moſt elegant Collections of Anatomical Obſervations printed in the Year 1682 at *Amſterdam* by *Weſten*: Add the *Myrocologia*, or a Treatiſe *De Ruminantibus* by the ſame Author; printed at *Baſil* in *Quarto* in the Year 1685, wherein he treats of every thing moſt curious in relation to the Ventricle and Inteſtines.

6. *Hieron. Fabricius ab Aquapendente* in his Treatiſes *De Ventriculo & Inteſtinis eorumq; Varietate*, where that Profeſſor of *Padua* in a moſt elegant tho' ſhort Style

treats of the Ventricles of ſeveral Animals, as may be ſeen in his *Anatomical* and *Phyſiological* Works printed at *Leipſick* in *Folio* with a Preface by *Bohnius*. You need add no other Authors except,

7. *Willis* in his *Pharmaceutice Rationalis* printed at *London* and *Oxford* in *Octavo*, where ſpeaking of Things oppoſing each other in the inward Parts gives firſt a Deſcription of the Ventricle: And,

8. Add *Ruyſchius* of *Lymphaticks* which lie ſcatter'd in his Obſervations, Epiſtles, and *Theſauri*, where are a great many beautiful Remarks.

SECT. V.

Of the Spleen.

TO underſtand the Nature of the Spleen you muſt read,

1. The *Theſis Inauguralis* of *Charles Drelincourt* the Son *De Lienoſis* in *Quarto*, who not long ſince took here his Doctor's Degree with a great deal of Honour. You have there whatſoever has been obſerved in Anatomy and Practice of the Milt or Spleen in all Ages to that Day when he wrote his *Theſis*. It is pity no one ever got it reprinted, for it was the Work of his Father in his old Age. Add to him,

2. *Lam. Velthuſius*'s Treatiſe *De Splene* printed at *Utrecht* in *Duodecimo* in the Year 1657, who deſcribed the Spleen in Imitation of *Gliſſon De Hepate.*

3. *Malphigius*, who perfected this Work; nor ought you to deſpiſe

4. *Ruyſchius De Splene, viz.* what you find ſcattered about in his three ſeveral Volumes (it's pity that they are thus ſcatter'd) wherein after *Malphigius* he wrote many Things of the Fibres, *Cellulæ*, and Lymphaticks of the Spleen, which Obſervations of his (I do not mean his Reaſons) are beyond the reach of all Criticiſm.

SECT. VI.

Of the Pancreas.

I Cannot but wiſh we had *Wirſing's* Treatiſe of the *Pancreas*. This Author was killed in *Italy* for Envy, becauſe he lately found out the Duct of the *Pancreas* at *Padua*; but in his ſtead you muſt read theſe others, *viz.*

1. *Reyner de Graaf*'s Theſes, and all his Anatomical Works.

2. What *Malphigius* obſerved of the *Pancreas* of Inſects and Fiſhes in his Poſthumous Works.

3. *Conrad Brunner* (who was always acceptable in all the Courts of *Germany*) in

his Experiments about the *Pancreas*. Then,

avu/ 4. *John* ~~*P[illegible]yem*~~, in his *Parerga Anatomica*, written on this Subject. But I cannot omit,

5. The learned *Wharton* in his *Adenographia*, where he has deſcribed every thing relating to the *Pancreas* to the ſmalleſt and moſt minute Nerve.

SECT. VII.

Of the Omentum or Cawl.

TO underſtand the Nature of the *Omentum*, or Cawl read,

1. *Hieron. Fabricius ab Aquapendente.*

2. *Tho. Bartholin* in his Poſthumous Works publiſhed at *Leyden* by *Hack.*

3. *Malphigius* in his Epiſtle *De Omento & Adipoſis Ductibus*. In which he alone demonſtrates what is the *Omentum* and its Uſe.

SECT. VIII

Of the Meſentery.

THERE are a great many Things to be conſider'd in relation to this Part. Read therefore theſe Authors, *viz.*

1. *Hieron. Fabricius ab Aquapendente*, who is to be read on all the Parts of the *Abdomen*.

2. *Tho. Bartholin* in his Treatiſe *De Vaſis Lymphaticis.*

3. *Gaſpar Aſellius De Lacteis Venis.* Add to theſe,

4. *Wharton* in his Chapter *De Glandulis Meſenterii.*

SECT. IX.

Of the Liver.

THE Structure of the Liver differs from the Fabrick of all the other *Viſcera*, ſince all the reſt have from the Arteries the Blood they receive in order to be changed; but the Liver as a *Viſcus* changes the Blood, but receives it from the Veins. Read therefore,

1. *Gliſſon* Anatomy Profeſſor at *Cambridge*, who was the firſt that diſcovered this, which he deſcribes in his Treatiſe *De Anatome Hepatis*, where are premiſed ſeveral Things belonging to Anatomy, and a little after he treats of the Lymphatick Veſſels; this is a fine Treatiſe, not only in reſpect of the Liver, but alſo for Diſſection: It is printed at *London* in *Octavo* in the Year 1654, and in *Duodecimo* at *Amſterdam* in 1665, which Edition is alſo very exact. Whoever reads this Author will find with what Exactneſs and Fidelity he wrote, and that he proceeded no farther than Diſſection: Read,

2. *Malphigius*'s *Opuſcula De Hepate*, which are as bright as any of his Works; where (when *Gliſſon* confeſſed he did not know what could ultimately act in the beginning of the *Bilious Ducts*) he diſcovered a very ſmall glandulous Kernel between the *Aorta* and the *Vena Cava*. Theſe *Opuſcula* were publiſhed in *Folio* in *London* after his Death, which alſo contain what he wrote againſt *Sylvius*; for after he had publiſhed his Treatiſe, there were raiſed ſeveral Objections againſt it, which are anſwer'd in his Poſthumous Works. After him read,

3. *Ruyſchius*, who obſerved this ultimate Kernel [*Acinum*] to be only a mere Texture of Veſſels. His Arguments againſt the *Folliculi* of *Malphigius* gave Occaſion of making many curious Experiments which were afterwards publiſhed.

SECT. X.

Of the Genital Organs.

OF the Genital Veſſels of Men, their Origin about the Loins, their laſt Iſſue in Men thro' the *Urethra* [in Women thro' the *Vagina*,] of their Inclination, Diſtribution, of the Courſe and Effect of their Parts, the beſt Authors are theſe that follow.

1. *Regner de Graaf* of *Delft.* He was Pupil to *Sylvius*, and as to the practick Part of Anatomy [Diſſection] was a Perſon of the greateſt Skill and Dexterity; he explained a great many Things, but very obſcurely, and had given us more had he not been taken off by the Plague. His Works are printed at *Leyden* in *Octavo* in the Year 1677 in *Latin* with very beautiful Figures; afterwards in *Flemiſh* likewiſe in *Octavo*, where the Figures are yet much finer, and there you will ſee as well the genital Organs of Women as Men.

2. You muſt read *Leal Lealis*, Profeſſor in the Univerſity of *Padua* in his Treatiſe *de Partibus Viro propriis* [περὶ οργανῶν σπερματοποίων] wherein are ſome very curious Experiments. I took Care to have them engraven by *Vander Linden*, to be bound up with the Anatomical Works of *Barth. Euſtachius* in the Year 1709.

3. *Cowper's* two Works [I mean thoſe that relate to Men] in one of which towards the End you have many beautiful Paſſages in relation to the Structure of the *Membrum Virile.* The other is a Treatiſe of Glands printed at *London* in *Quarto* which is very ſcarce.

4. A ſmall Book put out by *Morgan* two Years ſince in *Quarto* at *Rome*, containing many Anatomical Obſervations, wherein

this Author inſerts a great many Things omitted by other Anatomiſts.

5. *Ruyſchii Obſervationes*, wherein that Author obſerves, for Example, that the Head of the *Penis* is a Production or an *Appendix* of the ſpungeous Body of the *Urethra*, and that it has nothing common with the two hollow Bodies of the *Penis*. A thing no one ever before took Notice of, by which many Diſtempers of the *Penis* are diſcovered. This Diſcovery therefore is entirely owing to him: And,

6. *Bonclarius Dathyrius* in his Treatiſe *De Teſtibus Virilibus*. This Author has a Mind to be unknown, as we may perceive by this fictitious Name: But whoever he be, it is certain his Treatiſe is very excellent, but very ſcarce. It was publiſhed in the Court of *Tuſcany*. He was the firſt who diſcovered that the *Teſtis* conſiſted of a great many Veſſels folded up together. To him if you add *Leal Lealis*, you will have a perfect Syſtem of the *Teſtes*.

SECT. XI.

Of the Organs of Women.

THeſe Authors are to be read, *viz.*

1. *De Graaf*, who has admirably well deſcribed what may be diſcovered by the naked Eye.

2. *Fallopius De Tubis Fallopianis.*

3. Beſides the Structure of the *Uterus* and the *Tubæ Fallopianæ* you have many excellent Things in *Valſalva.*

4. *Swammerdamm* in his *Miraculum Naturæ*, with his Tables dedicated to *Tulpius.*

5. *Hieron. Fabricius ab Aquapendente* wrote admirably well on this Subject, eſpecially in his Treatiſe *de Ovo Incubato & Generatione* in his *Phyſiological* and *Anatomical* Works publiſh'd at *Leipſick* in *Folio*, in the Year 1687; no Phyſician can well be without him.

6. *Harvey de Generatione Animalium*; had King *Charles* I. lived longer and ſupply'd him with Money, as he began, we ſhould have had a Work of the utmoſt Perfection: For what is more perfect than his two Books of the Circulation of the Blood and Generation? We want ſome of this Author's Writings, for in the Civil War they were all diſperſed; but theſe are to be firſt read, the others elſe will not be underſtood.

7. *Cha. Drelincourt, De Fæminarum Ovis de Fœtus tunicis, Umbilico, de Humoribus Fœtus perilochiis, ſive Conceptus de Conceptu.* You ought by all means to find out this Author, he was a deep and moſt faithful Searcher into Things, his Works are inter-

ſperſed with admirable Obſervations, and are printed at *Leyden* by *Ronteſtein*.

8. *Raymund Vieuſſens*, *De Vaſorum in Corpore humano Structurâ*, printed a few Years ſince in 12*mo*.

9. *Anthony Nuck*'s *Deſcriptio Uteri* in 8*vo*. printed at *Leyden* in the Year 1697. And laſtly,

10. *Malphigius*'s Epiſtles *de Utero*, and what we find written in his poſthumous Works *de Utero & Generationis Naturâ*, and his two Epiſtles *de Generatione & Ovo incubato*.

SECT. XII.

Of the REINS.

WE ſhall refer the Reins, by reaſon of their Connection with the foregoing Parts, to this Place. On which read,

1. *Barth. Euſtachius*'s Treatiſe *de Renibus*, which is nothing inferior to his other Works, but moſt excellent, and is ſo very ſcarce as it can hardly be bought for 20 *Florins*; but I have taken care to have it printed in 8*vo*, to which are added Braſs Figures; theſe Figures were cloſe kept for a long while in the Libraries of the Princes of *Italy*, and were obtained by great Art and Difficulty; he deduces every thing to Mathematical Exactneſs, and deſcribes ſe-

veral things which he imagines were late and modern Diſcoveries. He was Contemporary with *Veſalius*; he alſo ſaid he had ſome Hundreds of Tables repreſenting Human Bodies, the better to ſearch into the Nature, Uſe, and Property of the Reins; I have taken Care to make diligent Enquiry after theſe in *Italy*, but hitherto I could never hear of them; if ever I get them, I ſhall forthwith have them publiſhed.

2. *Laurence Bellini* put out a Treatiſe in *Italy*, but this I have got printed ſome Months ſince for your Uſe, and is called *Tractatus de Renibus & Lingua*. He borrowed many things from *Euſtachius* (for every Body have privately taken from this Author the neweſt and moſt glorious Diſcoveries, and publiſhed them for their own) but however he added ſome things to *Euſtachius*.

3. *Malphigius De Renibus*, and

4. *Frederick Ruyſchius* in his Obſervations and *Theſauri*.

SECT. XIII.

Of the Glands: or, Adenography.

Αδὴν ſignifies a Gland, and conſequently *Adenography* is the Deſcription of the Glands, which was diſcovered after *Splanchnology*, and therefore I have put it into this Place; but in reality it is indifferent where it be put. Upon this read,

1. The moſt learned and eminent *Engliſhman*, Dr. *Thomas Wharton*, a Writer of the greateſt Authority, Caution and Fidelity (whom I have before hinted at) he did not truſt much to Argument, but a great deal to Experience and Diſſection; his *Adenograpia* printed in 4*to.* in *London* in the Year 1656, is the beſt of any on Account of the Figures, which are admirable. The *Amſterdam* Edition in 12*mo* is good enough, but the Figures are not ſo exact. You will find in this celebrated Author not only a wonderful Deſcription of the Glands, but an incomparable Reſearch into their Nature, Uſe, *&c.* For Example, he has ſeveral beautiful Obſervations on the Nature of the *Proſtates*, *Teſtes*, Seminal Veſſels; he was the moſt accurate and exact of any Man living in theſe Matters, and made a great many curious Experiments upon Animals; for Example, Whether the *Veſiculæ Seminales* make, change, or contain the *Semen?* or if it is there repoſited for Generation, *&c.*

2. *Malphigius*, *De glandulis conglobatis*, in his Epiſtles to the Royal Society of *England*, which you will find in the *Philoſophical Tranſactions*, and in his Poſthumous

Works: I believe this Treatiſe of his of the Glands has born ten Editions.

3. The *Adenography* of *Anthony Nuchius*, printed at *Leyden* in 8*vo*. This Author diſcovered ſeveral Things which had eſcaped *Wharton*; however he got no great Credit in writing againſt *Malphigius*, for *Malphigius* in his Poſthumous Works admirably well refutes him.

4. *Cowper*, printed at *London* about ſix Years ſince in 4*to*. and,

5. *Frederick Ruyſchius*, in his Obſervations on the Glands, as they are ſcattered in his *Theſauri*, Epiſtles, and Obſervations.

Of the Glands in particular I take no Notice, for they are to be found in the Deſcription of their Situation and Parts; for Example.

1. *Thoſe of the Jaws are deſcribed by* Schneider.
2. *Thoſe of the Liver and* Pancreas *by* Malphigius. And,
3. *Thoſe of the Inteſtines by* Peyer.

CHAP. IV.

Of the Fourth Part of Anatomy.

Angiology.

Angiology is a Deſcription of the Veſſels properly ſo called, and if you pleaſe you may place this and *Adenography* immediately after *Myology*.

1. Veſſels properly ſo called are Canals which carry the Humours from the Heart to the outermoſt and moſt minute Point of the Body, and convey them back again from every outward and inward Point to the Heart.

2. They contain in them the ſecreted and ſtagnating Humours. Theſe are called by others *Folliculi* and *Veſiculæ*, this Part therefore contains,

1. *Arteries.*
2. *Veins.*
3. Veſiculæ *and* Sinæs, *&c. of all which in their Order.*

SECT. I.

Of the ARTERIES.

THE Riſe, Nature, Diſtribution of the Arteries, and their iſſuing out in order to perform their two ſeveral Functions, are of abſolute Neceſſity to be known by a Phyſician; and,

1. *Is required a perfect Knowledge of the Situation and Diſtribution of the larger Arteries through the whole Body, for the Uſe of Surgeons, that they may be aided in Diſſection or in curing of Wounds.*
2. *Their Riſe and End ought to be known for the Theoretick Uſe of Phyſick.*

Whoſoever would know their entire Diſtribution, let him inſpect,

1. *Veſalius*, *Page* 195, where is a moſt exact Table or Figure of every Thing that has been publiſhed, but it is not perfect, for at that time he could not attend to it. After him conſult,

2. *Cowper*'s third Table in the *Appendix* to *Bidloo*'s great Anatomical Work, printed in *London*; where are repreſented all the

Species of the Arteries from the *Fœtus*, filled with Wax.

3. *Ruyſchius* has publiſhed the ſame by Parcels, but you muſt however add his Figures, becauſe they ſhew the Ends or Extremes of the Arteries unknown before that Time.

4. *Lewenhoeck* deſcribes the Extremities of the Veins in living Animals in his Works at large, where he treats of thoſe Veſſels that are to be inſpected thro' the Microſcope, eſpecially in the third and laſt Tome of his Obſervations, where he deſcribes the Iſſue of the Arteries into the Veins.

5. Read every thing contained in the *Philoſophical Tranſactions* of the Royal Society, under the Title *De Microſcopio*. And,

6. *Bellinus* in his *Opuſcula* to *Pitcairne*.

SECT. II.

Of the VEINS.

ON the Veins you ought to conſult.

1. *Veſalius* in his Third Book, Page 268 of both Editions, where you will find Figures of all the Veins engraven, their Riſe, Diſtribution, and their ſeveral Ramifications, and ſo plain that the naked Eye may perceive them; nor have I hitherto known any

ny Place or Table whaſoever ſo good as this. It is a whole folded Sheet of Paper; but if you would ſee the Arteries and Veins together, as they run in the Body, read the ſame Author [*Veſalius*] *Page* 319, where the Veins and Arteries are repreſented with the Parts of a Human Body. But if you deſire to ſee the *Valvulæ Peruſe*,

2. *Hieron. Fabricius ab Aquapendente* (all whoſe Works I recommend to you) in the Chapter *De Venarum Valvulis.*

And I am very well aſſured if you ſtudy after this Method, you will never err in the Theory of Phyſick.

SECT. III.

Of the Lymphatick Veſſels.

I. I Come now to give you my Advice in Relation to the Lymphatick Veſſels: But firſt of all I muſt tell you the Opinion which I always entertained on this Subject, and I hope it will deſerve your Approbation.

II. A Lymphatick Veſſel is then a Veſſel in which is contained a limpid Liquor; for what have hitherto been deſcribed by Authors are what are obvious to the naked Eye. If therefore ſuch only were to be conſidered, I could readily give you Inſtruction;

ſtruction; but all what occurs amongſt Authors, relating to Lymphatick Veſſels, teach us only, that they are Veiny Veſſels of a ſufficient Size, conveying ſuch a Liquid, and are only to be called Veins; for a Vein is a Canal containing a moved Liquid which is moved towards the greater Canals, and at laſt to the Heart, but never towards the Extreme Parts: Lymphaticks then by the Ancients are only deſcribed to be mere Veins, and that they are mere Veins I thus demonſtrate.

1. Every Canal which from a narrow Beginning is parted towards larger Spaces is a Vein: But every Lymphatick by Authors hitherto deſcribed are thoſe which from inviſible Roots are extended to a larger Place, therefore they are Veins.

2. Every Vein is a Canal in which through the Side Branches is derived a Liquid (but not ſecreted from it) and all the Veins are largeſt towards the Heart, and narroweſt at the other Extreme, as are the Lymphatick Veſſels of Authors, from their inviſible Roots, whoſe Side Branches immediately ſpread themſelves into the great Trunk, but nothing is thence derived.

3. Every Lymphatick has its *Valvulæ*, which no Arterial Veſſel has, unleſs it be the *Valvula Aortæ* at the Heart; the Mathema-

ticks demonſtrate that in a Canal in which a Liquid is carried from a narrow to a broad Space the whole Perpendicular Series cauſes an Obſtacle, but ſo as the Liquor cannot retire; there are *Valvulæ* where the Vein is broader, but there are no where more *Valvulæ* than in Lymphaticks, which are always about an Inch diſtant from each other.

4. A Vein is that which at laſt brings back to the Heart a Liquid infuſed from the extreme Parts into the greater Arteries, but all Lymphaticks (now deſcribed) do this. Therefore, *&c.*

III. All Lymphaticks of the Brain, according to *Ridley*, diſcharge their Liquid into the Jugular Vein. On this ſee,

1. *Lower* of the Lymphaticks of the *Thorax*, which carry its Liquid into the *Ductus Pequetianus*, and thence into the Heart.

2. *Bartholin De Lymphaticis Abdominalibus*, which carry its Liquid into the lacteal Veſſels of the *Meſentery*, or the *Ciſterna Rubetiana* under the *Diaphragma*, thence into the *Ductus Pequetianus*, and thence into the Heart.

3. *Nuchius De Lymphaticis Partium Inferiorum.*

IV. Therefore there is none of you but what will believe all Lymphaticks hitherto deſcribed are mere Veins, but there is no Vein but has its Artery; for all things are moved by the Motion of the Heart, therefore they have their Veſſels from the Heart which gave them their Liquid, and which are not Veins, for the Heart does not move its Liquid but through the Arteries; therefore in a Body, beſides Blood Arteries, there are alſo Lymphatick Arteries. Perhaps you may ſay theſe are all fictitious; in anſwer to which I affirm, That there cannot be aſſigned a Place where a Lymphatick Vein begins, for wherever you ſee it, it is a hundred times bigger than the ultimate Blood Artery ſeen through a Microſcope. We muſt therefore find out its Origin from an inviſible Artery; for it cannot riſe from a Blood Artery, for then it would carry Blood; it muſt therefore be a Veſſel which is an Artery, and carries a Liquid more tenuious than Blood, and which is leſs than the laſt or ultimate viſible Artery; much leſs viſible then muſt of Conſequence the Lymphatick Artery be, whence it takes its Riſe or Origin, which carries a tranſparent or pellucid Liquor; and therefore ſuch Arterial Lymphatick Veſſel is not viſible by the Microſcope, which yet Reaſon tells us is certainly there; but theſe Lymphatick Arteries, not the Lymphatick Veins, are viſible till a great many Branches of the Veins make a larger viſible Branch with the *Valvulæ*. I do not ſee the Blood in the Foot of a Flea, and yet I am certain it is there.

V. Where the red Blood paſſes from the Artery into the Vein from its Sides there riſe almoſt infinite Canals, at leaſt ten times leſs than the ultimate or laſt Artery, thro' which by the Arterial Pulſe the Blood applied to the Sides of the Artery is expreſſed with a ſtrong Motion, while the thicker Blood, deprived of this Liquid, paſſes into the Veins; theſe Side Branches we call Lymphatick Arteries of the firſt Kind or *Genus*, to wit, which carry their Liquid by the Arterial Motion, that is, by the Canal which throws out, not congregates Liquids, and its Veins at firſt are inviſible, but when a great many meet together they become viſible.

VI. That Lymphatick Artery goes into its Lymphatick Vein, and there makes lateral Lymphaticks ſo much leſs than the former as the Arterial Lymphatick of the firſt Kind or *Genus* is leſs than the Blood Artery; theſe we call Lymphatick Arteries of the ſecond Kind, and ſo on; for how far theſe Subdiviſions may extend we know not, but I am certain that the Law of Circulation in us is ſo, and that there are actually Lymphatick Arteries of Lymphaticks, and perhaps the *Lympha* which is ſecreted in the Lymphaticks of the third Kind is the *Succus Nervoſus.*

VII. Now this is abſolutely neceſſary to the Nutrition of thoſe Parts which are not red, as the Nerves, Tendons and Glands; for a great Part of the Body has no Blood Rivulets; eſpecially ſince it is evident we were nouriſhed in the *Fœtus* where there was very little Blood, and this Liquor was neceſſary to keep the Veſſels open, and to the Nutrition and Appoſition of the Parts: As alſo ſince part of the Body ſeen through a Microſcope plainly appears to be abſolutely deſtitute of Blood Veſſels; this Part, notwithſtanding, is full of little Veſſels, and there muſt be Nutrition in that Part; there muſt therefore, of Conſequence, be Arteries, ſince without Arteries there would not be a lateral Preſſion and Appoſition, which is requiſite in Nutrition: Beſides, a Body muſt be flexible, but there can be no Flexion unleſs where the Parts are incredibly tenuious, but ſuch are not the Blood Veſſels, for they are too thick (what is more flexible than the *Cutis* Ligaments,

ments, *&c.* and yet they have no Blood?) but there can be no Flexure made by the largeſt Veſſels without ſuch Veſſels ſuffer a Rupture in their upper Surface or Superficies, as if you would bend a hundred Sheets of Paper, the upper Leaves would be broken, ~~but~~ one Sheet will eaſily be rumpled or folded up together. Veſſels therefore were abſolutely requiſite whoſe Membranes might be infinitely leſs than the Tunicles or Membranes of the Blood Arteries; but the largeſt Veſſels which conſiſt of Membranes, are flexible, becauſe their Membranes conſiſt of the moſt minute Arteries, and ſo on, and therefore every thing that is flexible is moſt tenuious.

VIII. But how many Species are there of theſe Veſſels? it is credible their Subdiviſion is far greater than we imagine, for my part I believe that it goes ſo far till all the Veſſels are equally ſmall and the *Liquidum Nutriens* ſo tenuious as that in the Riſe or Origin of the Nerves in the Brain; hence there may ariſe Nerves out of every Artery, tho' they are only moveable and ſenſible from the *Cranium*.

IX. The Lymphatick Arteries loſe themſelves in two Places, *viz.*

1. They exhale their Liquid on all the Superficies of a Body as well external as internal, and there alſo correſpond with theſe Arteries, the leaſt abſorbent Veſſels; for *Bellini* diſcovered that as the whole *Cutis* expired according to *Sanctorius*, ſo likewiſe does it inſpire according to his own Experiment, ſo that there is a continual Inſpiration and Expiration of the Body, as well internally as externally.

2. The Lymphatick Arteries empty themſelves into their correſpondent Lymphatick Veins.

X. Authors who have written on the Lymphatick Veſſels.

1. *Lud. de Bils* of *Coperdam*, a Nobleman who dedicated himſelf entirely to the Study of Anatomy in living Animals, but he never troubled himſelf much with Authors or Letters. He put out a ſmall Book at *Rotterdam* in the Years 1661 and 1669 of his Labyrinth and *Ductus Rorifer*, illuſtrated with ſeveral Figures. It is now very ſcarce, but his Arguments are not very good; for he fancied they took their Riſe from the *Ductus Chylifer*, and that the *Ciſterna lactea* was at the Loins from which the Milk is diſperſed to the Breaſts like driven Dew. Next to him is

2. *Olaus Rudbeckius* a *Swede*, his *Opuſcula* are very ſcarce but moſt excellent, and are four diſtinct Treatiſes of the Lymphatick Veſſels.

1. *Is his* Nova Exercitatio Anatomica, *repreſenting in thirteen Tables the* Hepatick Ducts *printed at* Leyden *in the Year* 1654 *in* 12mo.
2. *Clears up a great many Things, and is entituled,* Inſidiæ in Olaum Rudbeckium Structæ circa Ductus aquoſos à Tho. Bartholino, *printed at* Leyden *in the Year* 1654 *in* 8vo. *and in* 12mo.
3. *Is a Treatiſe* Pro Ductibus Hepaticis contra Bartholinum, *printed alſo at* Leyden *in the Year* 1654 *in* 8vo.
4. *Contains his Epiſtles to* Bartholin De Vaſis Seroſis, *printed at* Upſal *in the Year* 1657 *in* 12mo; *which laſt is the beſt of all his Works; his Books are very ſcarce, and therefore you ought to read*

3. *Hempſterhuys*, in his Treatiſe called *Meſſis aurea Anatomica collecta ab Hempſterhuyſio* in 4to, where you will find *Rudbeckius*'s Diſcoveries, as alſo thoſe of *Bils* and *Bartholin*. This Book you muſt buy by all means.

4. *Tho. Bartholin De Vaſis Lymphaticis nuper inventis* in his Treatiſe *De Lymphaticis*

ticis & Chyloſis Vaſis, as alſo his *Opuſcula nova Anatomica* printed at *Amſterdam* in 8*vo* by *Clave* in the Year 1670; but theſe you have in the *Meſſis Aurea* of *Hempſterhuys*.

5. *Gliſſon De Hepate*, printed in the Year 1654, towards the End, where he has ſeveral beautiful Paſſages *De Vaſis Lymphaticis recens inventis*.

6. *John James Paulus* againſt *Bils*'s Anatomy and Opinions, *De Ductu rorifero*, printed at *Strasburg* in the Year 1665.

7. *Fred. Ruyſchius*, an Author never ſufficiently to be praiſed on theſe Topicks, in his Book *De Lymphaticorum Valvulis* printed at the *Hague* in the Year 1665 in 12*mo*. His firſt Treatiſe was publiſhed while he himſelf lived at the *Hague*, and is moſt ſcarce. *Hempſterhuys* has collected them all except a few in his *Meſſis Aurea*.

8. *Malpighius* in his Work *De Glandulis conglobatis*; and in his Poſthumous Works he diſcovered many curious Things relating to theſe Veſſels. And,

9. *Nuckius* in his *Anatome Uteri* and *Adenographia*. But amongſt all theſe Authors you will only find a Deſcription of the Lymphatick Veins.

APPEN-

APPENDIX.

FOR your greater Eaſe and Memory this ſhall be divided into two Parts.

1. *The firſt ſhall ſhew you what Authors have written on the ſingle Parts of the Eye, Ear and Tongue. And*
2. *The ſecond ſhall tell you ſuch Authors who have treated of* Enchyreſis *or Diſ-ſection of dead Bodies; and to theſe ſhall be added thoſe who have written Syſtematically, and therefore are called Syſtematicks* [Syſtematici.)

Enche

PART I.

Of the ſingle Parts.

I. *Of the Eye.*

ON the Eye you muſt read theſe Authors, *viz.*

1. *Plempius* in his *Opthalmographia*, which you may purchaſe at an eaſy Rate with all his Works, or by it ſelf.

2. *Nuckius* in his *Obſervationes de Oculorum Ductibus aquoſis & Humoribus.*

3. *Hovius* in his *Diſputatio Inauguralis* held at *Utrecht*, wherein are many curious

Obſervations on the Eye, tho' you muſt not entirely rely on him in every thing he ſays.

4. *Ruyſchius*, who has many beautiful Remarks on the Tunicles and Veſſels of the Eyes in his *Theſauri* and Obſervations no where elſe to be met with.

5. *Briggs* in his *Opthalmography* printed at *Utrecht* in 12*mo*.

II. *Of the Ear.*

Thoſe who have chiefly written on the Ear are

1. *Barth. Euſtachius* in his *Opuſcula Anatomica* lately put out together in 8*vo* at *Leyden*.

2. *Du Verney De l'OUIR*, printed at the Royal Preſs in 8*vo*. The *Latin* Tranſlation made in *Germany* is not worth much, the Tranſlator having not taken the Senſe of the Author; beſides, the Figures are dirty and abominable. He is certainly the moſt perfect Author I know of, but he has notwithſtanding three very great Faults in Relation to a certain Nerve and the *Ductus* of *Fallopius*, otherwiſe he is very valuable. It is pity this Man laboured under ſuch Calumny that he could not publiſh, as he promiſed, his Work of the other Organs of Senſe.

3. *Valſalva*, all what he added to *Du Verney* might be contained in twelve Lines; he is not to be compared to *Du Verney* in *Quarto*, but deſerves to be read on account of his Obſervations *De Cochlea & Labyrintho*. To theſe may be added

4. *Schellamer*, but he is not very neceſſary ſince every thing he ſays may be found in *Du Verney*.

III. *Of the Tongue.*

Authors on the Tongue are,

1. *Bellini* in his Treatiſe *De Guſtus Organo recens detecto*; but he has not much in him if you compare him with *Malpighius* in his Deſcription of the Organ of Taſte.

2. *Fracaſſatus*. What this Author has added is indeed of a conſiderable Bulk, but of no great Moment.

Bellini therefore is ſufficient for Experiments in his Treatiſe juſt now mentioned, which is printed by it ſelf, and *Malpighius* for the Organ.

There are ſeveral other Authors who have given us not their own but other Peoples Labours, but ſuch I think not worth mentioning.

PART II.

Of Enchyreſis; *or, Diſſection of a dead Body.*

WHen you have a Mind to diſſect dead Bodies and to introſpect them without any one to ſhew you, and to do this in Order you need only theſe three Authors.

1. *Michael Lyſerus* in his Treatiſe *De Cultro Anatomico* in 8*vo*. This Author travelled all over *Europe*, and deſervedly had Penſions from the Diſſectors; and when he returned from his Travels he wrote a Book for the Uſe of his Scholars, *Of the Order of Diſſection*; that is, when the Fat of the *Cutis* is to be removed, what *Viſcera* are to be firſt cut up, and in what Order the Veſſels are to be ſhewn. *Bartholin* was very much troubled that this Book was publiſhed, becauſe it too much diſcovered his own Profeſſion.

2. The great *Veſalius* in his Anatomical Work, printed in the Year 1606 in *Folio* at *Frankfort*, wherein after every Chapter he teaches how every individual Part is to be demonſtrated and expoſed. There is no one can be compared to this Author, not even *Lyſerus*, for he tells you every the moſt minute Circumſtance. This Book, which is in *Folio*, ought to be purchaſed by every one of you.

3. Thoſe that underſtand *Engliſh* ought to have recourſe to *Cowper*, whom they will find a moſt excellent Inſtructor in his *Myotomy*, printed at *London* in 8*vo*, to which he added his new Diſcoveries from *Du Verney* and *Fallopius*. I am very certain you may be Maſter of all theſe in the Space of a Quarter of a Year.

SYSTEMATICKS.

Of the *Syſtematicks*, the firſt is

1. *Andrew Veſalius* in *Folio.*
2. *Renaldus Columbus.*
3. *Spigelius* in *Folio*, printed at *Amſterdam* on Royal Paper.
4. *Riolanus* in his *Anthropographia*, you cannot be without this Author.
5. *Tho. Bartholin* in his *Anatomy* printed at *Leyden* in 8*vo*.
6. *Verheyn* in his *Opera Anatomica*, printed after his Death in *Quarto* at *Bruſſels* in the Year 1710, where you have every thing collected that is modern and of late Diſcovery, and is alone ſufficient for thoſe who cannot get the others before-mentioned.

The End of the Second Book relating to Anatomy *and all its Parts.*

BOERHAAVE's METHOD OF Studying Phyſick.

BOOK III.

Of the Theoria Medica; *or, The* Theoretical *Part of Phyſick.*

I HAVE now in the Two foregoing Books told you all Things which are pre-required in a Phyſician. It remains now that I give the beſt Counſel and Advice I am able in Relation to the *Theoretical* and *Practical* Parts of Phyſick; or, in other Terms, the Contemplation and Exerciſe of this moſt uſeful and noble Science. And herein a great many Things are carefully to be taken notice of, leſt you fall into Errors or Miſtakes which are always attended with fatal Conſequences.

But as this Science (as I have juſt now hinted to you) is two-fold, *Theoretical* and *Practical*, I ſhall therefore, for Order-ſake, in this Third Book diſcourſe of the former only, *viz.* the Theory, reſerving the latter for the next Book and Cloſe of this Work.

That you may the more eaſily retain in your Memory what I ſhall diſcourſe of in this Third Book, in Relation to the Theory of Phyſick, I ſhall uſe this Method, that is, divide the whole into the three General Heads or Chapters following.

1ſt Chapter ſhall treat of the Uſe of the Parts or *Phyſiology.*

2. Of particular Functions; as

1. *The Sight.*
2. *Hearing.*
3. *Smelling.*
4. *Taſting.*
5. *The Touch*, or Feeling; and,
6. *Generation.*

3. In the 3d Chapter I ſhall diſcourſe of *Pathology*, under which are comprehended,

1. *Semeioticæ.*
2. *Hygieine*, and
3. *Therapeutice.* Of all which in their Order.

CHAP. I.

Of the Uſe of the Parts, or Phyſiology.

I. USE teaches us what Effects every Thing has in Relation to any Good or Profit. The Uſe of the Parts therefore is to explicate the Functions or Actions of the Body which are exerciſed by theſe Inſtruments. He therefore who knows all the Effects requiſite to Sickneſs and Health moſt undoubtedly knows the Theory of Phyſick.

II. He who by the *Mathematicks*, *Chymiſtry*, *Botany*, and *Pharmacy*, hath made himſelf acquainted with the Actions of Nature which obtain in all ſorts of Bodies, and which are exerciſed by the Common

Laws, is certainly ſufficiently inſtructed in that general Knowledge which is requiſite to Phyſick.

III. He therefore who knows firſt how Bodies commonly act, if from Anatomy he has acquir'd a thorough Knowledge of the Parts of which a Human Body conſiſts, or its coercent Veſſels, *&c.* is prepared in the ſecond Place to underſtand and explain thoſe Actions which are performed in a Human Body.

IV. An Action of a Human Body is a Motion which is exerciſed by ſuch a Part which concurs to the Fabrick of our Body, and depends on thoſe Things which are common to our Bodies with other Bodies, and thoſe Things which are proper and peculiar to them. Thoſe which are common to us with other Bodies, are the Objects of the *Mathematicks*, &c. and he who is well acquainted with them, is capable to explain them by others.

V. But he who knows theſe Principles, and yet makes uſe of no good Method, will ſtudy to very little Advantage; and if he uſes more than he need, he errs too that way; but he who makes uſe of nothing but what may be drawn from the *Mathe-*

maticks and *Anatomy* will never miſtake. If he makes uſe of; and would know more than theſe admit of, he will certainly fall into thoſe Errors ſeveral great Men before him have fallen into, *viz.* *Borellus*, *Bellini*, *Bernouille*, *Heckleus*, &c. who were ſo knowing in the Method of finding out hidden Truths; and yet when they admitted what they could not demonſtrate, they ſtraitway fell into very great Miſtakes.

1. *Borellus* excellently well exploded the Cauſes of Muſcular Motion thitherto aſſigned, but he added ſomewhat which he himſelf could not explain: For he fancied that there was ſomewhat that made the Liquid rarify as ſoon as it enter'd the Muſcle, like *Oil of Vitriol* and *Salt of Tartar*, which being mingled together, will expand and fill up the *Veſica*; and when the Effervesſcency is ended, will ſlide back again. He therefore imagined ſomething like this in a Muſcle; but in this he deviates from his own Method; for it does not any way appear from the Mathematicks, that there are ſuch boiling Juices in us.

2. *Bernouille*, in his Treatiſe of Muſcular Motion which you have at the End of *Vander Aa*'s Edition of *Borellus*, lays down theſe things following as *Poſtulata*, *viz.* Firſt, he will have it, That in a Muſcle the Nervous and Arterious Juices are joined

together in one Place. But it appears moſt evident to me, that where an Artery throws out its Juices, there can be no Nerve; for Arteries are the Cauſe of the Motion of the Nerves. Secondly, he lays it down for granted, that the Nervous Juices flowing to thoſe of the Arteries, ſo attenuate them, that the Air being at Liberty expands it ſelf. But he does not demonſtrate this by any Experiment or Argument. All that I would infer from this is, that a celebrated Author may ſometimes err, when he aſſumes more than he is able to demonſtrate. So did

3. *Heckleus* in his Notions *De Attractione, & Momentanea Aeris Expanſione*; when notwithſtanding a Contraction of the Muſcles may be made in Half an Hour, and left off at one's Pleaſure. This is a great *Poſtulatum* of his, and I deſpair of ever ſeeing it demonſtrated.

VI. If therefore we would follow good Advice, we muſt keep our ſelves within theſe Bounds in this our Study of the Theoretick Part of Phyſick; that is, aſſume nothing but what is certainly demonſtrated in *Mechanicks*, which never fail, or *Chymical* Experiments, or clear demonſtrated in *Chymicks*, unleſs it be when the Queſtion is (*Borellus*, for Example, falſly ſuppoſed ſuch

Actions in our Body, as there are in *Oil of Vitriol*, and *Salt of Tartar*) either concerning the Nature of Vegetables or Pharmacy, or the Nature of Solids and Fluids in Anatomy. If then we aſſume no more than is evident from theſe ſix Heads, we ſhall never run into Errors, but when we go beyond theſe we infallibly miſtake.

This Part by many is called *Theoria Medica*, as well as *Phyſiology*, that is, a natural Exquiſition of certain Symptoms, *Phænomena*, &c. But we follow *Galen* (who in this was the beſt of any) in treating of the Uſe of the Parts.

VII. We muſt now ſpeak ſomething of thoſe Authors who have ſo written on this Subject, that we may know true Effects from true and undoubted Cauſes. There is no Neceſſity to crowd your Library with all who have undertaken to do this, but only to chuſe thoſe who deſerve Credit and Reputation.

Now all thoſe who wrote before the Year 1628, whether *Greeks* or *Latins*, are good for nothing; for they were Strangers to the *Harvean* Syſtem of the Circulation of the Blood. For this is the only principal Cauſe on which depends all the reſt: For what ſignifies it that we know the Structure of the Parts, unleſs we know by what Order, Force and Velocity the Humours continually flow through them? But this before the Year 1628 was altogether unknown.

For take *Daniel Sennertus*, who was a moſt learned and ingenious Man, yet in his Explication of the Actions of the Ventricle, for Example, it is aſtoniſhing to ſee how many frivolous Cauſes he aſſigned; and as he collected all what he has from the foregoing Authors, you may reaſonably ſuſpect what they offered.

Another Reaſon is, that the very Helps he made uſe of were prejudicial to him (for he ought to have known the *Indoles*, or Inclination of the Humours, the Structure of a Body, and the Laws of Motion) for at that time roſe up the Chymiſts, who derived all things from chymical Cauſes. Take any Author you pleaſe, and he will have all things made either by *Fermentation* or *Ferment*, or *Efferveſcency*; and he will reduce all things to theſe three Heads. If therefore it be demonſtrated, that there is no ſuch thing as Fermentation in the Blood, this Doctrine of Conſequence is good for nothing.

IX. There remains now only the third Order of Philoſophers to be conſidered of: They, for Example, who would explain the Laws of Motion in our Body by the Help of Mechanicks and Anatomy: But theſe were almoſt all of them *Carteſians*, who would explain all relating to Phyſick according to the Notions of *Des Cartes*. For *Des Cartes* endeavoured to explain the whole Man in a little Treatiſe which he called *Traité de l'Homme*, where you will ſee theſe looſe Laws he fancied, *viz.* He would have it, that from a ſmall Bubble of fermented Liquid thrown fully out into an Arm, Head, *&c.* the whole Man was formed; and thus by a continual Ferment of the former Subſtance the whole was created. It is ſtrange and aſtoniſhing, that this Perſon who was ſo bright in Geometry, ſhould produce ſuch *Hypotheſes*, while he applied himſelf to the Study of Phyſick, which he himſelf had rejected in a Peripatetick. He ſaw how a ſmall Drop could be expanded, and that Milk rarified by the Fire; he would therefore have it, that a Fire in the Heart cauſed an Expanſion of the Blood falling into it; and theſe Philoſophers ſaid, that the Pores through which they would have the Secretions of the Blood to be made, were the Cauſe of all Motions in the whole Body; and ſet up ſuch Notions which afterwards were ſoon embraced by all the Mechanicks. But as I ſaid before, we ought to admit of nothing but what can be demonſtrated or underſtood.

But *Pitcairne* demonſtrated, that the Effects of all the Pores were the ſame. The Pores therefore contribute nothing to Secretion, ſince it is evident from *Hydroſtaticks*, that they are all circular. Beſides this, they called in to their Aſſiſtance the Ætherial Matter of the firſt Element; but why does not that glide into infinite Spaces where it may more freely be moved? Moſt of the Profeſſors who have held theſe Opinions have uſed this Explanation. You ſee then to what Streights we are reduced, ſince before *Harvey* ſo little Good could be done.

X. To recommend to you any Authors in this Part of Phyſick, a Man muſt act with this Prudence, as to tell you of none but ſuch whom it will be worth your while thoroughly to read and ſtudy: who have taken nothing for granted but what they have ſearched through by the external Senſes, and have laid down nothing at all as Principles for Argumentation, but what has been demonſtrated in Phyſicks and the Mathematicks. There are then two Conditions requiſite: The external Senſes teach us the Laws of *Phyſical* Changes *in Genere*, or of our Body *in Specie*; and hitherto we have told you what Authors in Phyſicks and Anatomy have treated of this. Whatever therefore hath been demonſtrated in *Phyſicks*, *Chymiſtry*, and *Anatomy*, and whatſoever clearly follows from thence by good Reaſoning or Argument (that is, which ſo accurately inheres in them, that it immediately follows the former Conception as a Conſequence or Concluſion) may freely be laid down and acknowledged as a Principle.

XI. If therefore you would compoſe a perfect *Phyſiology*, firſt collect with an unwearied Application all the Experiments of Nature which are in all Obſervations, and digeſt this diffuſed Matter *in Methodum Adverſariorum*; and that this you may the more eaſily do, read

1. Lockius, *De Adverſariis conſcribendis* printed at *Amſterdam.* If you will have an Example of this, read

2. Sir *Francis Bacon*, Lord of *Verulam*, in his Treatiſe *De Vento & Calore*, or his *Sylva Sylvarum*, where you will find what you deſire.

XII. Another thing requiſite in theſe Authors, is, that when they would argue from theſe Principles they muſt take nothing but a general Principle, which is ſo clear as to admit no manner of Doubt; and ſuch are Mechanical Principles, which are called the Laws of Nature, to which belong *Hydroſtaticks* and *Hydraulicks*, and theſe we may faithfully rely upon. No Part is to be fancied or imagined, but to be deſcribed according to Nature, in aſſigning the Motion of Liquid to any Part from the Anatomy of living Bodies, Ligatures, Injections, *&c.* He therefore who would know hidden Cauſes from theſe Principles muſt call in to his Aſſiſtance *Mechanicks* and the *Mathematicks*, an Example of which I will give you in ſhort.

XIII. The *Anatomiſts* demonſtrate, that an Artery is a circular Veſſel, in all perpendicular Sections, and the more remote from the Heart is narrower, and broader the nearer it approaches to it. Cutting off any thing that is alive, demonſtrates that the Blood is thrown from the Heart only in a moſt violent Motion. Theſe are Principles laid down in Anatomy; but if you would find out what may follow from hence, you muſt have Recourſe to what the Mathematicks have demonſtrated, *viz.* That if Liquor be preſſed in a Conick Canal, ſo much Preſſion will occupy every Point, as is the Line ſticking againſt the Side; and there is no Particle which is not immediately changed from its Site, Motion, and Direction; the Liquor then muſt be attenuated, but never thicken: And all this is true, if a Liquor alſo is carried thro' a Cone without Gravitation and Shaking.

XIV. Authors on this Subject are

1. *Alphonſus Borellus* (by far the beſt) in that elaborate Work of his *De Motu Animalium*, in compiling of which he ſpent ſo many Years, nay, his whole Life and Strength. Buy (if you can) the *Roman* Edition printed in the Year 1680, which is very ſcarce; it is abſolutely the beſt on Account of its exact Figures. But it was likewiſe put out by *Vander Aa* in the Year 1710, the Print of which is very beautiful, and I have taken Care to add thereto *Bernouille*'s Treatiſe of Muſcular Motion. I cannot recommend *Borellus* as one that never erred againſt theſe Laws, for he admitted more than he ſhould have done, *viz.* That in the Blood there was ſomewhat cauſing an Efferveſcency; and *Bernouille* would have it, that the Blood and Spirits flowed into one Veſſel, which Anatomy does by no means demonſtrate. After him read

2. *Bellinus* in his Treatiſe *De Urinis & Pulſibus*, which no one ought to be without; the Edition of *Bologna* in 4*to* printed

in 1683 is the beſt: But that put out by *Bonchius* (who was a Phyſician and Philoſopher) at *Franckfort* in 4*to* in the Year 1685 is almoſt as good, except in the Paper which is not ſo fair. His Places are very few where you expect the Obſervation of theſe Laws; this Author rarely laying down any thing which is not moſt exquiſitely Mathematical: But he deviates from the firſt Law, when he ſays that there riſes a Rarefaction in Muſcular Motion, that as ſoon as the Spirits are determinated into the Blood there riſes an Efferveſcency which expands it ſelf, but this is not demonſtrated by Anatomy. Had he contented himſelf to have lain down nothing but what might be thence clearly demonſtrated, *viz.* that the Blood and Spirits flow to the Muſcles, and by their Aggregation make them ſwell, he had not been in the Wrong. In his Treatiſe to *Pitcairne* he ſays nothing of the Cauſe of Muſcular Motion, which makes me believe he afterwards laid by that Syſtem. Read alſo his *Lemmata* (which are prefixed to this Work), of what relates to Muſcular Motion, Reſpiration and the Motion of the Heart. His Diſſertations contain a very curious Matter, and they are as ſo many Rules according to which moſt things may be explained. You ſhould alſo read his

Letter to the Grand Duke of *Tuſcany* of Reſpiration, it is indeed ſhort but very nervous, and printed in the Year 1671, and no where to be met with but in the *Miſcellanea Curioſa* herein before mentioned. Read

3. His *Tria Opuſcula De Motu Cordis*, &c. to *Pitcairne*, printed in 4*to* by *Bonteſtein* in the Year 1696. (By his Death we deſpair of ever ſeeing his *Opus Anatomicum*, which he entirely collected by correſponding with *Francis Rhede* and *Malpighius*.) In this Treatiſe he is no way faulty..

4. *Archibald Pitcairne* in his *Diſſertationes Medicæ*, printed together in 4*to* at *Roterdam* in 1701, the Stile is very plain; as to the Circulation of the Blood through the Lungs he is very perfect, in other things he aſſumed too much, as in his laſt Treatiſe of *Opium*. But however his Works are very excellent.

5. *Matthæi Georgii Elementa Scientiæ naturalis* printed at *Lucca* in *Italy* in 4*to* in the Year 1707, where he builds his Theory on very certain Principles. After him,

6. If you underſtand *Italian* you ſhould read his Treatiſe *Of the true Method and Temerity in Phyſicks*; this Book was printed at *Genoua* in the Year 1709 in 8*vo*, which he ſent to me; it is a noble Treatiſe. His *Liberal Phlebotomy* printed at *Genoua* in 4*to*

in the Year 1697 deſerves likewiſe your Peruſal, wherein he philophizes with a great deal of Liberty purely from *Mechanicks* and *Anatomy*. After him,

7. *Aſcanius Maria Baſicalva*, put out at *Parma* in his *Novum Syſtema Phyſico-Mechanicum de Humoribus*; it is a Book entirely Medical. He was Scholar to *Bellini*; in this Work you have the Effects of the *Major Attritus* from Circulation. You may remember I taught this not long ſince my ſelf, but I did not know this was publiſhed by that Author, for I never ſaw his Book till ſome few Months ſince.

8. *Cockburn* in his *OEconomia Animalis* printed at *London* in *8vo.* This Gentleman ſignify'd to me he was preparing another Edition. He has many fine Things deduced from Philoſophy.

9. Thoſe who are well verſed in the Mathematicks let them read *John Keil Of Animal Secretion* in *Engliſh*, which contains as fine Things in Phyſick as can poſſibly be written by any Mathematician. But he has ſuppoſed what does not appear from Anatomy, of the Attraction and Dilatation of the Globules of our Liquid; but what he has written of the Celerity of the Blood in its Veſſels, and of the Weight by which the Air preſſes on the Blood in the Lungs is very fine. Add to theſe,

10. *Bernouille* late Profeſſor at *Groninguen* and now at *Baſil*, in his *Meditata de motu muſculari*, of which we have told you before are ſeparately contained in the *Acta Leipſienſia*, and now printed at the End of *Borellus*'s Book.

11. *Perault* in his *Eſſayes de Phyſiques*. This Author had a great Genius, well skilled in the Mathematicks, and perfectly ſo in Phyſicks, enjoying the Benefit of the Anatomical Demonſtrations of *Du Verney*, *Mariotte*, *&c.* at *Paris*. He wrote with great Art and Skill many Things relating to the Animal Functions, Sight, Hearing, *&c.* and ſeveral other Things.

12. To this Subject likewiſe belong the Anatomical Diſſertations of *Lamy* (Dr. of Phyſick in *Paris*) with his Letters and Meditations, entituled, *Diſſertations Anatomiques*, the laſt *Paris* Edition in 8*vo* in the Year 1685 has more in it than the former Edition; he does not prove every thing, but explains moſt of our Functions from *Phyſicks*, *Mathematicks*, and by the Help of *L'Emery*'s *Chimicks* and Diſſection of dead Bodies, there were ſome warm Diſputes between him and *Du Verney*, which made them act afterwards with more Caution; and thus the Contentions of ſuch great Men turn very often to our Advantage.

13. Add to theſe *Cole*, *De Secretione Animalium Tentamen* printed at *Oxford* in 12*mo* in the Year 1674, and afterwards at the *Hague* in 1682 likewiſe in 12*mo*.

Theſe are the Authors you ſhould ſtudy if you have a Mind to read with Profit and Advantage thoſe who have treated of *Phyſiology*; and do not wonder that I have not recommended to you the *Phyſiological* Works of *Galen*. For before the Diſcovery of the Circulation of the Blood it was impoſſible that any one ſhould explain thoſe Functions which depend only on the Circulation of the Blood.

CHAP. II.

Of Particular Functions.

I. *Of the SIGHT.*

1. OF the Object of Sight, Proprieties of the Rays, Colours, *&c.* the only one who has written well is Sir *Iſaac Newton*, and in Reality the laſt Edition in *Latin* printed at *London* is preferable to the former.

2. Of the Nature of Solar Rays, as they are reflected or refracted, *Andrew Tacquet* a Jeſuit *De Catoptricis* and *Dioptricis* deſerves your careful Attention; and this Author is almoſt ſufficient.

3. But if you will have theſe explained and applied to the Eye, read *Scheiner's* Works, or *Fundamentum Opticum*, printed at St. *Winnox Bergue* in 4*to* in the Year 1619; it is a very ſcarce Book, and explains every thing admirably well. To him add

4. The *Dioptrica* of *Deſcartes* and *Huygens*.

II. *Of the* HEARING.

On the Function of the Ear, Nature of Sound, and its Proprieties, read

1. *Kercher* in his *Phonurgia* & *Tractatus Muſici* printed at *Rome* in *Folio*. Add to theſe his two Treatiſes *De Muſicis*, wherein he explains how the Sonorous Rays come and go, and are reflected by Eccho. Theſe are likewiſe printed at *Rome* in *Folio*.

2. *Merſenne's* Experiments in 4*to*, entituled, *Collectio Experimentorum Phyſico-Mechanicorum*.

3. Sir *Iſaac Newton* in his inimitable Book of the Mathematical Principles of Natural Philoſophy, which treats of the Nature of Sound, its Propagation thro' given Spaces in a given Time.

4. Of the Function of the Ear read *Lamy* in his *Diſſertations Anatomiques.*

5. *Perault* in his *Eſſays de Phyſique.*

6. *Du Verney* in his Book *De l'Organ de l'Ouir.* And

7. *Valſalva,* who is far preferable to *Du Verney* as to the Theory of Hearing.

III. *Of the* SMELL.

Of this Function read

1. *Le Clerque* in his *Oſteology,* where he has many curious Things from *Du Verney* of the Organ of Smelling. After him

2. For underſtanding the Membrane on the Bone read *Schneider De Cathar:*

3. For the Mechanical Action conſult *Palfin* in his new Deſcription of the Bones, printed only in *Flemiſh,* where you have *Du Verney*'s Method.

IV. *Of the* TASTE.

Authors to be read on this Function are

1. *Fracaſſatus* (an *Italian* Profeſſor of Phyſick) in his Epiſtle of the Tongue to *Malpighius*; you will find this in *Malpighius*'s Works. I recommend him becauſe he treats of many things relating to the Nature of ſolid Bodies, and no one has ever publiſhed finer Experiments on that Subject.

2. For their Application to the Organ of Taſte you muſt read *Malpighius*, *De Guſtus Organo.*

3. *Bellini*'s new Experiments on the Taſte, which are now ſold here. To theſe you may add

4. *Boyle* in his Treatiſe *De Mechanicis Saporum Productionibus* printed at *London* in 8*vo.*

V. *Of the* TOUCH.

Read *Malpighius*'s Treatiſe *De Organo Tactus, Lingua & Cute*, which partly you may find in his Epiſtles, partly in his Poſthumous Works, where he has diſſected them Phyſiologically and Modeſtly.

VI. *Of* GENERATION.

That you may underſtand how this wonderful Propagation is made, by what Inſtruments, Actions of Matter and Principles, and how they are changed, you muſt read

1. All thoſe Authors juſt now recommended to you.

2. Of the Origin and Fabrick of the *Ovum* in a Woman, its Maturation and paſſing into the *Tuba Fallopiana*, its entering into, and Maturation in the *Uterus*: Peruſe the *Conceptus de Conceptu Humano*, by *Cha. Drelincourt.* This is the beſt Author on this Subject.

3. Of the Conjunction, Maturation of the *Semen Maſculinum in Ovo Fæmineo* you muſt read *Hieron. Fabric. ab Aquapendente* in his Treatiſe *De Pulli ex Ovo Generatione.* And *Malpighius* in his curious Treatiſe *De Bombyce,* and in his two Treatiſes (which ſurpaſs all the reſt) *De Ovo Incubato,* I think he has ſaid all that is poſſible on that Subject. How many Difficulties in every one of his Experiments has he ſurmounted? and yet he plainly relates nothing elſe but Experiments. Add to theſe

4. *Harvey*'s Obſervations *De Animalium Generatione* whom I have made honourable Mention of in Anatomy, but he was yet much more excellent in Phyſiology; he explained himſelf with great Warmth and Ingenuity in his ſeveral Diſſections of the larger Species of Animals, as Mares, Cows, and other Quadrupeds (the Expence of which was ſupplied by King *Charles* I.) one Hour after Coition, two Hours after Coition, and ſo on to a perfect Geſtation. Moſt of his Papers were burnt in the great Fire of *London.* To him we owe our Knowledge of the *Ovaria,* which the Ancients called *Teſtes Muliebres.*

5. But of the Riſe and Origin of the *Semen* in Man, its Secretion, Collection, Maturation, Fecundity and Expulſion, you muſt have Recourſe to *Leal Lealis, Cow-*

per, *Ruyſchius* and *Lewenhoeck*, who have all of them very curious Experiments.

6. You have admirable Obſervations about Generation collected in the *Hiſtoire de l'Accademie Royalle de Paris*, printed at *Paris* in 4*to*, and afterwards at *Amſterdam* in 8*vo*, where you will find the Obſervations of a great many Authors, as *L'Emery*, *Du Verney*, *Lyſter*, and others, *viz.* that ſometimes the *Fœtus* is found to be extravaſated into the Cavity of the *Abdomen*, and other times in *Teſte Fæmineo*, in the *Tuba Fallopiana*, *in Hernia Uteri*, &c. In that you have every thing which before was but very obſcurely treated of.

CHAP. III.

PATHOLOGY.

PAthology is that Part of Phyſick which teaches in general the Knowledge of Diſtempers, their Preſence, Differences, Cauſes and Effects.

That Part which teaches the Nature of Diſtempers, is called *Noſology*, to which likewiſe the Differences of Diſtempers belong.

Aitiology is that which treats of general Cauſes, and is called *Symptomatology*, or a Deſcription of Effects or Symptoms.

In this Part there are very few good Authors, ſo that I can ſcarce name one that is perfect. My *Inſtitutions* which I wrote for private Uſes do by no means pleaſe me, for I had not time then to digeſt them.

Pathology ought to follow from *Phyſiology*, but this no Author has undertaken. The beſt that I know of are

1. *John Fernelius* that noble Luminary of Phyſick in *France*, who from his Infancy dedicated himſelf to the ſublime Speculations of the Mathematicks; when he was advanced to the Profeſſors Chair to teach Phyſick, he was the firſt that exploded the Opinions of *Galen*, and evidently demonſtrated wherein he was miſtaken in his Arguments: But he wanted *Harvey*'s Light and Penetration and tript very often, however he is the beſt I know of. A Diſtemper as it is *Læſa Actio*, before a Man can know what that is he ought firſt to be acquainted with the Notion of *Actio Integra*, but this is impoſſible without knowing Circulation. Hence this Author almoſt always heſitated; his Book in a very ſhort time bore ten Editions: The beſt Edition is that of *Geneva* in *Folio* in the Year 1679, at that time he was thought worthy to be

read with *Hippocrates* in *Leſſons* of Phyſick. His Books of *Pathology* are excellent.

2. *Sennertus* on Account of his great Judgment, Diligence and skilful Knowledge of Ancient and Modern Authors in Chymiſtry, was called the *Hippocrates* of *Germany*; his Works have born more than twelve Editions, the beſt is in Six Tomes in *Folio* printed at *Lyons* in the Year 1676. From this Author you will learn all the ſeveral Opinions of the *Greeks*, *Romans* and *Italians* on the ſeveral Claſſes of Diſtempers and their Symptoms. But neither *Fernelius* nor *Sennertus* are anywiſe herein ſatisfactory, as being too prolix and verboſe, ſo that a Man forgets what he had read before; what they wrote relating to the Differences and Cauſes of Diſeaſes you muſt paſs by; the reſt will be uſeful to you.

Theſe are all I can any ways recommend to you, for the more Modern always feign and invent their own Syſtems and Hypotheſes, from whence they draw their Concluſions, as *Sylvius* for Example, and *Tachenius*, who ſuppoſe their *Alcali* and *Acid*. We come now to diſcourſe more particularly what is contained under this Head or Chapter: And

I. Of SEMEIOTICE.

Σημειοτική is an Indication of Signs, from σημεῖω, to teach by Signs; that is, by paſt, preſent, and future *Phænomena*, paſt, preſent, or future Health, Sickneſs or Death may be foretold or known: For Example, I know a Man who had yeſterday moſt violent Movements in his Body and drank nothing, this is a paſt *Phænomenon* (*Phænomenon* is every thing that we can apprehend by our external Senſes) and now I know without touching him, that he is ſhort breath'd, has a quick Pulſe, is hot, *&c.* From paſt *Phænomena* I know, that to Day his Urine is reddiſh, and thence I likewiſe foretel what will happen, *viz.* That his whole Body will ſeem as if it had been beaten with Sticks.

Semeiotice therefore has for its Object Life and Health as well as Sickneſs; this ſhews its Neceſſity. The thing ſigned is what is firſt known by a Sign. A Sign is a preſent, paſt, or future known *Phænomenon*, teaching ſomething not apparent.

There is no Part in Phyſick better, or more neceſſary than this, when we are ſent for to a ſick Perſon. From the foregoing Signs I know his State of Life, Health and Sickneſs; from this I know all *Signata*, which teach us at the ſame time what the Diſtemper requires, or what we ought to do. The Patient, for Example, tells me he has a violent Pain in his Side, a ſharp Cough, complains of Heat, difficult Reſpiration, and has a high Pulſe. Two or three Days afterwards I ſee him ſpit Blood with Corruption (I do not ſuppoſe yet to know his Diſtemper) and that he either recovers by Degrees, or dyes. In another Perſon in the like Caſe I find the whole Body turn livid; and on opening him afterwards find the Place gangren'd, or full of purulent Matter. I am then ſent for to another Patient, in whom I diſcover the like Signs; and from thence I know that they have ſuch internal Effects. For which Reaſon the moſt eminent Phyſicians now-a-days are very expert in *Semeiotice*. Some however, inſtead of it, have ſet up *Hypotheſes* of their own, and have thence drawn their Prognoſticks. The Chymiſts who have no Manner of Regard to Signs, fancy there is a certain univerſal Medicine, which they will have to be infallible, which is indeed like the *Materia Prima* of the *Carteſians*. Read all Authors and you will find this to be true.

If therefore you conſider the Health of your Patient and Succeſs, be moſt attentive to this Part; for you had much better be ignorant of Anatomy, Chymiſtry, and Mechanicks, than this.

And here I ſhall recommend to you the beſt Authors I can.

1. Read *Hippocrates*; but that you may lay a regular Foundation from him in diſtinguiſhing Diſtempers, and thence to prognoſticate, you muſt read his Works in the following Order.

1. *You muſt read his Book called* Προγνώ ϛικον *There was never any thing better written than this. He relates every thing with the greateſt Prudence in a very plain Stile; rejects Trifles; and reduces all things to Cauſes the moſt ſimple.*
2. Προῤῥητικὴ; *or his two Books* De Prædicationibus. *None of his Books have come to us more perfect and entire than theſe.*
3. Κοακαὶ Προγνώσεις; *or* Coacæ Præcognitiones. *This is a wonderful Book, and far different from the preceding, but cannot be underſtood till you have firſt read them: It teaches the Knowledge of things. To this Book alone I owe all what I can prognoſticate in Phyſick. You will not be able to underſtand it at the firſt and ſecond Reading; but after reading Authors and Practice, you will wonder to find ſuch things as are there-*

in

in contained. For Example, in the Chapter of the Pleuriſie *and* Quinſie, *&c. where he deſcribes all their Species.*

4. Περικρισεῶν; *or his* Liber unicus de Indicationibus; *and there you will find at what time, and how the ſeveral Changes are made in human Bodies.*
5. Περικρισίμῶν; *or one Book* De Diebus ~~Indicationis.~~ Judicatoriis
6. Επιδεμικῶν, *being Seven Books of Epidemical Diſtempers.*

I am very certain that you will thank me as long as you live for this Counſel and Advice. Study all theſe ſingly in the Order as I have placed them. You will ſee at leaſt Examples of all what he propoſes, which he did for the Uſe of his Sons, that he might enrich them with his divine Art. Of the other Works of *Hippocrates* I ſhall make mention in the Hiſtory of Curing Diſeaſes. After him read

2. *Galen* in the fourth Tome of his Works. The beſt Edition is that of *Venice* in the Year 1609. The whole is *Semeiotical*; read him eſpecially where he treats *De Urinis & Pulſibus*. There he reckons up a Hundred different Diſtempers which he never ſaw; then he explains all Symptoms by the four Elements of *Ariſtotle*, but he

gives us the Text of *Hippocrates* in his Commentary *in Coacæ Præcognitiones.*

3. *Lewis Duret* in his Commentaries on the *Coacæ* of *Hippocrates.* The beſt Edition is that of *Paris*, printed in the Year 1588 in *Folio*, but it is ſcarce to be had. The other Editions are alſo good. This Author is a very *Hippocrates*; he reduced into Order what were diffuſed and obſcure, and explained them by his great Skill in the *Greek*: But he is not to be underſtood at once Reading. If you conſult him for the *Apoplexie*, you will find in him all the *Hippocratica* and *Galenica* of this Diſtemper. No one has a better Index.

4. *Deſiderius Jacotius*, in his Commentaries *In Coacas*, which is alſo very ſcarce, for it goes under another Title. If therefore you can get *Hollerus*'s Commentaries on the ſame Subject (the beſt Edition of which is that of *Leyden* in the Year 1576, in *Folio*) you will there find *Jacotius*; for there were ſome Diſputes between *Duret* and *Jacotius* the Son. If you cannot get theſe, you will find in *Duret* ſufficient *De Coacis Holleriana & Jacotiana.* This Author (*Duret*) travelled thro' *Arabia*, and was the firſt in *Europe* who recommended the reading *Hippocrates.* He was Scholar to *Jacotius.*

5. *Proſper Alpinus*, in his Treatiſe *De Præſagandâ Vitâ & Morte*; this Book is lately reprinted, *viz.* in the Year 1710 in 4*to* [I wiſh we had his Book *De Prædicendis Morbis futuris*, which he mentions, and perhaps lies ſomewhere privately in *Italy*. I have endeavoured to find him out but to no Purpoſe.] This Book muſt be read Night and Day, and then the Event of no Diſtemper will eſcape you. He has in him every thing that is good relating to Preſages, which *Hippocrates*, *Galen* and the *Arabians* had.

6. *Laurence Bellini* in his Treatiſe *De Urinis & Pulſibus*, who teaches the true Method of reaſoning from Principles on theſe Subjects, which none before him ever did; he examined Urine in all its Circumſtances whatſoever, within and without the Body, and thence concluded, that in ſuch a Diſtemper ſuch would be the Urine. His Treatiſe *De Pulſibus* is the beſt I ever knew publiſhed, wherein he examines the Cauſes of all Changes both *Anatomically* and *Phyſiologically*.

7. *George Baglivius* printed at *Leyden* in *Quarto* in the Year 1710. He is not near ſo valuable as the foregoing Authors. He argued without Experiments and with too great a Liberty; but tho' he wrote

without Order, yet he has ſome *Signs* which you will find no where elſe.

II. *HUGIEINE.*

Ὑγιεῖνη ſignifies the Goddeſs of Health, and conſequently the Art of conſerving Health and defending our preſent Strength and Vigour by the Uſe of external and internal Applications.

The Means or Inſtruments by which this is done are what we call

1. Geſta.
2. Ingeſta, *as Meat, Drink, Clyſters, Injections,* &c.
3. Retenta & Excreta, *and*
4. *Outward Applications.*

And in theſe Four *Hugieine* wholly conſiſts: The Ancients ſaid it conſiſted *in Regimine ſex Rerum non naturalium.*

Authors to be conſulted on this Subject are

1. *Cardan* [a Phyſician of *Bologna*] *De Sanitate tuendâ,* which you will find in his Works printed at *Leyden* in Ten Tomes in *Folio* in the Year 1663. If you can get this Book you may be without all others, but it is very ſcarce. No one wrote better than this Author when he wrote well, and

none worſe when he wrote bad: For in him Nature knew no Medium: He was a great Critick in his Writings on other Phyſicians. Read his Life in the Preface and it will pleaſe you better than any Comedy or Tragedy.

2. *John Brunner* in his Treatiſe *De Re Cibaria lib.* 22. printed in 8*vo* at *Lyons* in the Year 1560, is the only one who has treated this Subject with ſuch conſummate Erudition and Art.

3. *Melchior Sebizius*, a Perſon of the higheſt Learning, eſpecially in Practice. He lived to be a Hundred Years old in perfect Health both of Mind and Body. He wrote Five Books in *Quarto De Alimentorum Facultatibus*, printed at *Strasbourg* in the Year 1650. If you can but get theſe you have all you can deſire. As this Perſon wrote from the Age of Nineteen till Ninety, and as his Works in his Youth were admired by all the World, how valuable are thoſe of his laſt Years?

4. *Galen* in his Treatiſe *De Tuenda Sanitate*, which treats not only *De Re Cibaria*, but alſo *De Regimine Omnium ſex Rerum non naturalium*. This is one of his moſt learned Treatiſes. After him read

5. The *Medicina Statica* of *Sanctorius*, and in reality before him ſcarce any one came to the Point. He tells us, how what

we take is changed into our Humours, what Meats exhale from us without *Fæces*, what Aliments agree with the weaker Sort, and what with thoſe that are more robuſt and ſtrong, in this his Divine Treatiſe: which ought to be ſtudied by every Phyſician.

6. The *Praiſe of Sobriety*; or, *Methodus ad Centum Annos perveniendi licet Corpus debile ſit* of *Cornaro* a noble *Venetian* is a very good Treatiſe. This Author wrote in a Poetical Style, it is printed in a great many Languages and with other Books.

7. *Bacon* Lord of *Verulam*, in his *Hiſtory of Life and Death*, and *Aphoriſms for prolonging Life*, printed in *England* in 8*vo* in *Engliſh*, and not yet tranſlated, containing a Deſcription of the Lives of ſome that lived a long while in that Country in perfect Health, where you will ſee their Method of living, and thence you may learn very good Obſervations and Advice.

8. *Hieron. Mercurialis* in Six Books, *De Arte Gymnaſticâ* printed at *Paris* in 4*to* in the Year 1577; this Edition is very fine. He was Profeſſor of *Padua*, and explains the Exerciſes of the Ancients to ſtrengthen the Body and diſpel Diſtempers at their Beginning. This Treatiſe is of much Learning not full of Words, which when you thoroughly know you will have a per-

fect Idea of thoſe Exerciſes. Others that have written ſince have only copied from him.

III. *THERAPEUTICE.*

Therapeutice is that Part of Medical Inſtitutions which teaches us to diſcern in ſick Perſons what Diſtempers they labour under, and thence to learn what is requiſite to their Cure and to be applied, that is, to find out and diſcover

1. The *Signa Indicantia.*
2. Their *Indications*, and
3. *Indicata Remedia.*

1. But firſt it is neceſſary to explain the Means or Inſtruments Phyſick makes uſe of, and theſe are either *Mechanical* or *Chirurgical*, *Victus* or *Materia Medica*, of which we ſhall ſay ſomewhat in the next Book relating to the Practice of Phyſick; or, *Praxis Medica.*

On theſe the beſt Authors are

1. Fallopius.
2. Dale *in his* Pharmacologia *printed at* London.
3. Markgrave De Materia Medica, *which are ſufficient for this Part.*

2. The Second Part explains the *Methodus Medendi*, which propoſes Rules by the Help of which you may find out the *Indicantia*, *Indicata* and *Contra-indicantia* or *Repugnantia.*

It is no eaſy Matter to aſcertain what Authors deſerve to be read in this Part; for before *Harvey* they were all full of *Elements*, *Faculties*, &c. if, for Example, you conſult *Greek Galen*, *Roman Celſus*, or any *Arabian* whomſoever, how theſe *Indications* are to be taken? they tell you from the *Elements* or *Faculties*, whether the Patient be dry, humid, affected with the *Bile*, *Melancholy*, &c. and they ſay you muſt take away what is ſuperfluous, and ſupply what is deficient. If you have a Mind to ſee this read the Works of *Argenterius* printed at *Padoua* in *Folio.* This Author had a great Name amongſt the Methodiſts, but he was very unhappy in curing of Diſtempers, for he was a *Syſtematick* and built on a falſe *Hypotheſis.*

But thoſe who began to write well on this Subject, are

1. *Melchior Sebizius* in his Treatiſe, entituled, *Galeni Methodus Medendi* printed at *Strasbourg* in 4*to* in the Year 1639. But

2. The *Methodus Medendi* of *Bernard Swaloe* printed in 12*mo* at *Amſterdam* in 1657 is yet much better and more compendious; and as it was written ſince the Diſcovery of the Circulation of the Blood; is of Conſequence the only and beſt Treatiſe for Beginners.

3. *Francis Sylvius De la Boe* wrote a ſmall Treatiſe *De Methodo Medendi*, it is the cleareſt Book he ever publiſhed, if you paſs over his *Alkali* and *Acid*; you have it in his Works in 4*to* but not in 8*vo*, nor in his *Praxis* with his *Theſes*.

4. *John Walleus*, heretofore an Ornament to this Univerſity, wrote alſo a *Methodus Medendi* printed at *Augsburg* in 12*mo* in the Year 1679; how great a Man this was you may learn from his two Anatomical Epiſtles of the Circulation of the Blood, and of the Chyle to *Tho. Bartholin*. The laſt Edition of *Leyden* is full of *Anatomical* Experiments. He wrote a *Methodus & Praxis Medendi* accommodated to Circulation, but this Work is very difficult to be met with. Add to theſe

5. *Daniel Sennertus*.

The End of the Third Book relating to the Theoria Medica; *or, the* Theoretical *Part of Phyſick.*

BOER-

BOERHAAVE's METHOD OF Studying Phyſick.

BOOK IV.

Of the Praxis Medica; *or, The* Practical *Part of Phyſick.*

WE have now laid the Foundation of Studying Phyſick, what remains is only that I give it a finiſhing Stroke, by conſidering what is requiſite in order to learn its *Praxis* in reſpect of Authors. If any where, moſt certainly here, muſt be recommended ſuch only as are approved: But I ſhall not tell you of any but ſuch as I my ſelf moſt like, and who therefore will not bind any Body.

The Practice of Phyſick conſiſts in the knowing in every particular Patient by particular Signs the Particulars of his Diſtemper, and thence to cure him by a particular Method as well as particular Remedies. It differs from Inſtitutions in as much that in theſe general Obſervations are propoſed to a Phyſician which he muſt obſerve and keep, the better to exerciſe this practical Part; for Practice is the ultimate Perfection of Phyſick, which therefore conſiſts

1. *In knowing every particular Diſtemper by particular Signs, and*
2. *In curing ſuch particular Diſtemper by a particular Method. For Example, I ſee a Man faint away, which I cure not by any thing good in general againſt Fainting, (for there is no ſuch thing in Nature as a univerſal Method) but I conſider this particular Fainting, and that it is perhaps the Effects of ſeeing ſome frightful Object, or ſmelling to Musk, or the like. I ought therefore to ſearch out particular Cauſes, but at the ſame time to retain the general.*

All Cures are made by ſome certain Means or Inſtruments which may repel either

1. *The Cauſe of the Diſtemper; or,*
2. *The Diſtemper it ſelf; or,*
3. *The Effects of the Diſtemper.*

Hippocrates and *Celſus* reduced theſe to three, *viz.*

1. *The Hand.*
2. *Diet: And*
3. *Medicines.*

And therefore the *Praxis Clinica* conſiſts in finding out and duly applying

1. *Chirurgery, or Surgery.*
2. Diætetice, *and*
3. Pharmaceutice.

Which are properly comprehended in theſe two Parts, *viz.*

1. *Chirurgery,* or *Surgery,* which cures Diſtempers externally by the Hand.
2. By *Medicines* inwardly taken, which is an internal curing of Diſtempers.

I ſhall therefore accordingly divide this Book into two Parts.

1. The Firſt ſhall treat of *Chirurgery* (or *Surgery*) or the *Praxis Medica externa*; to

which I ſhall add the Names of thoſe Authors who have written *Syſtematically*, thoſe who have written of particular Diſtempers, and ſuch others whom we ſhall call *Operators* and *Obſervators* on Account of their Operations and Obſervations.

2. The Second ſhall treat of the Method of Diet [*Diætetice*] and the *Praxis Medica Interna*; to which alſo I ſhall inſert the Authors who have written *Syſtematically* on this Subject,. thoſe who have written on particular Diſtempers, and thoſe who have made their Obſervations; and laſtly, thoſe who have treated *De Conſilio Medico*, and then cloſe up the whole.

PART I.

CHIRURGERY; or Surgery.

C*Hirurgery*, or Surgery, is that Part of practical Phyſick which teaches us how to know and cure thoſe Diſtempers which can either mediately or immediately be managed and cured by the Hands. Since therefore the Hand by a dexterous Application aſſiſts us in curing of Diſtempers, it is evident that this Art has for its Object thoſe Diſtempers only which can be cured by the Hand, which we for that Reaſon call *Chirurgical*. For Example, in an Inflammation of the outward Parts no Diet or Medicine will avail any thing, but we muſt have Recourſe to the Surgeon's Launcet; ſo alſo a Diſlocation of the Shoulder is only cured by a dextrous Application of the Hand.

Surgery may be conſidered four Ways, *viz.* either as Syſtematical, or as treating of particular Diſtempers, or deſcribing Operations, or laſtly Obſervations; on all which there are an Infinity of Authors, and ſome very confuſed; I muſt therefore divide them into theſe four Claſſes following.

1. *Into thoſe who have written of Surgery Syſtematically, whom we therefore ſhall call* Syſtematicks.
2. *Thoſe who have written better on ſome particular Diſtempers than the* Syſtematicks.
3. *Thoſe who have written of Operations only; for Example, of the* Trepan, *that the Skin muſt be cut in ſuch a Place and the* Trepan *applied,* &c. *And*
4. *Thoſe who have deſcribed ſome Caſes in Surgery that have occurred to them in Practice, and theſe we call* Obſervators.

I. CLASS.

SYSTEMATICKS.

The *Syſtematicks* are thoſe who relate to, and treat of, the general Nature of all *Chirurgical* Diſtempers, their different Cauſes, Effects, Remedies, and their Method of Cure. I do not recommend to you thoſe who were only Compilers in their Chambers, but thoſe who have been famous in Practice, or who have been firſt Profeſſors of Anatomy. In this Part the Prince of all is

1. *Hippocrates*, in the Sixth Section of his Works publiſhed by *Fœſius*. There is no better Book in the World, tho' I muſt confeſs there are ſome Things very obſcure, becauſe the Writings of *Hippocrates* were ſuppreſſed for many Ages, and at laſt brought again to Light by Chance, and becauſe in the firſt Tranſlation a great many Errors were committed, which are likewiſe contained in thoſe that have been made more lately, otherwiſe it is a glorious Book, and you will find he was a famous Surgeon. You will do well if you add to him,

2. *Galen*'s Commentaries upon the Surgery of *Hippocrates*. For *Galen* was a *Grecian*, and lived in the Reign of *Septimius Severus*,

Fifteen Hundred Years ago, and wrote before Barbariſm had deſtroy'd the Writings of *Hippocrates*; and thus you will have the moſt perfect Work of Antiquity.

3. Read *Cornelius Aurelius Celſus*, who is better than all the Ancients and Moderns in Surgery. Read this Author on what Chirurgerical Diſtemper you pleaſe, and you will ſee he tells all what we now-a-days know; and therefore thoſe who ſay he was only excellent in the Theory, are falſe in their Judgment; nor was his High Birth any Impediment to him in exerciſing this glorious Art. He was famous for Dexterity of Hand, Caution, *&c.* and univerſally ſo thro' every Part of Surgery. He is admirable for Eloquence of Diction, full of Erudition, and inimitable in Cleanneſs and Brevity of Style. After him, read

4. *Gabriel Fallopius* in his *Opera Chirurgica.* He was a moſt dextrous Anatomiſt, and practical Surgeon; and I have often recommended him to you in this Treatiſe. Add to theſe,

5. *Joh. Andreas a Cruce*, a publick Profeſſor in *Italy* (known to a very few) in him you will ſee Art in Perfection, nor can you well be without him. He wrote with the greateſt Candour, and without Pomp or Magnificence of Style. This Work was printed at *Venice* in *Italian*, and

afterwards was tranſlated into the *Latin*, *French*, and *German* Languages; and yet (which is very wonderful) is ſcarce known to any one now-a-days. He wrote excellently well of Medicines, Inſtruments, *&c.* The *Italian* Edition in *Folio* is the beſt; in the *French* Edition he is called *JEAN DE LA CROIX.*

6. *Hieron. Fabricius ab Aquapendente* excelled every Body in his *Opera Chirurgica* in *Folio*. Theſe Works are printed in *Folio* at *Padoua*. He was an incomparable Anatomiſt, and was in his time very famous for Surgery all over *Italy*. He was good at Prognoſtication; and was alſo incomparable in inventing of new Inſtruments; you may better be without all the reſt than this Author. If any one would conſult an experienced, clear and candid Author, let him read *Aquapendens*, who in a very kind manner tells us what muſt be done to our Patients in our firſt Viſit.

7. *Marcus Aurelius Severinus*, a *Neopolitan* (in reading whoſe Works *Bartholin* ſaid he was amazed and ſtruck with Aſtoniſhment.) He was a moſt expert Profeſſor at *Naples* in Anatomy, Phyſick, and Philoſophy, and a Surgeon from his Infancy to his Old Age. His Treatiſe *De Trimembri Chirurgia*, and his other *De Medicina Efficaci*, muſt be often your Study. In Practice

he teaches when Diſtempers are to be cured by Cauſticks and the Knife, and when by Medicaments and Diet. You muſt buy theſe together, for the firſt is very difficult to be got; but this latter you may ſee at the End of *Hildans Obſervationes Chirurgicæ.*

8. *Ambroſe Pareus* printed in *French* at *Paris* in *Folio.* This Book is tranſlated into *Engliſh* and *Dutch*; but the Firſt Edition in *French* was put out by himſelf. It is wonderful how in ſo much Practice he could find Time to write ſuch a Work. But *Riolanus*, that invidious, tho' true, Cenſor of Authors, ſays, that as *Pareus* was in the Favour of three Kings ſucceſſively, he made uſe of their Authority, and obliged the moſt learned Phyſicians and Surgeons to compile that great Work; but owns that he ſupply'd them with Obſervations, and put his Name to it.

9. *John Vigo* an *Italian* deſerves your Reading; but it muſt be acknowledged he was in the wrong to have every thing to be cured by Inciſion and Cauſticks, otherwiſe his Book is excellent; but he is often miſtaken when he will have nothing elſe apply'd but ſuch or ſuch a Chymical Medicine, when nothing but the Knife will do. There are many Editions of his Works in *Quarto.*

10. *Vidus Vidius* an *Italian*, who was heretofore ſo very famous, is now ſcarce known; (he is commonly called *Vidi Vidi*) He wrote Four Books of Surgery in *Folio*, which were printed at *Frankfort* in the Year 1667. which is the beſt Edition, and there you have every thing together which you find ſcattered amongſt other Authors.

II. CLASS.

AUTHORS who have written on PARTICULAR DISTEMPERS.

Authors who have written particularly on ſome Diſtempers are to be made much of: And it is ſaid, that

1. *John Beringarius* of *Carpi* excels in the Fracture of the Skull, but I never ſaw him. He was the firſt that reformed Anatomy in *Italy*, and he boaſted that he got a vaſt Sum of Money only out of Mercury. This Work is printed at *Leyden* by *Herman Coryngius*.

2. *Marcus Aurelius Severinus* is excellent on *The Secret Nature of Impoſthumes, hard and wateriſh Tumours, the Cancer*, and other Abſceſſes of Matter into any Part. This Author (where-ever you buy him) will afford you ſo much Pleaſure, as you cannot eaſily leave off reading him.

3. *Fabricius Hildanus* is moſt perfect on the *Gangreen* and *Sphacelus*, and ſuch like Diſtempers, as alſo Burns by Fire or Gunpowder, and wrote admirably well on the Running in Ulcers.

4. *Chriſtopher Schellamer* of Tumours in Human Bodies. This Book was printed at *Geneva* in the Year 1695. If you have a mind to know all what relates to this Subject in a few Hours, you will find it in this Treatiſe.

5. Of the Diſtempers in the Eyes the only one in my Opinion is *Maître* Jean *Traité des Maladies de l'Oeil*, printed in 1707.

6. Of the Surgery of the Ears, *Du Verney*'s Treatiſe *De l'Ouir* mentioned before.

7. Of the Diſeaſes of the Bones, the beſt Author is the famous Surgeon of *Paris*, *PETIT*, in his Book *Des Maladies des Os*, publiſhed at *Leyden* by *Haak* in the Year 1709. This Author never had his Equal, and will hardly be mended; there is not ſo much as one little Mutation of a Muſcle in any Caſe omitted. He deſcribes the Inſtruments with a Mathematical Exactneſs, and never forgets the Veſſels, Nerves and Ligaments.

III. CLASS.

OPERATORS.

Thoſe Authors who have deſcribed *Encheireſes*, or Manual Operations, muſt likewiſe be read; and theſe are,

1. *Palſin*, a Native of *Gandt*, an Anatomiſt and Surgeon, in his Book printed at *Leyden* in *Dutch* in the Year 1710, there you have moſt accurately *Du Verney*'s Method, and the Demonſtrations he obſerved in Diſſecting of Bodies at *Paris*. He preſuppoſes an Anatomical Knowledge of the Parts. Add to him,

2. The *Operations Chirurgiques* in *French*, which give you the publick Demonſtrations made every Year by the King's Command in the Royal Garden at *Paris*. This Work deſerves the higheſt Encomium, for there you will find all the late Diſcoveries that have hitherto been made in Surgery. It is not the Author's Fault if you do not underſtand the Operations, for never any one wrote better on this Subject.

3. The *Operationes Manuales Chirurgicæ*, written by *Van Solingen*, printed while he was living by *Bonteſtein*.

4. Of Cutting for the Stone, read the laſt (not the firſt) Treatiſe put out by *Tolet*, *De Calculi Sectione*, printed in the

Year 1709. He cut a Hundred every Year, but heretofore he uſed another Method. This Book was written after *FRERE JAQUES* had publiſhed his.

5. The fulleſt Author *De Extirpatione Cancrorum* is *Denis* [*Dionyſius.*]

IV. CLASS.

OBSERVATORS.

Thoſe who relate the Hiſtory of ſingle Caſes as they have occured to them, are

1. *Fabricius Hildanus* in his *Obſervationes Chirurgicæ & Medicæ Centuriis plurimis.* This Book is in *Folio*; you will never find one who will tell you more than this Author.

2. *Forreſtus* in his Books of Surgery, where firſt of all he writes its Hiſtory, then adds his *Scholia*, which contains very learned Obſervations.

3. *Marchette* an Anatomiſt of *Padoua*, in his Treatiſe, entituled, *Les Obſervations Chirurgiques.*

4. *Roonhuyſen Heelkouſt* written in *Dutch* in *8vo.*

5. *Schultetus*, who has many excellent Things.

6. *Ruyſchius* alſo is admirable in his *Obſervationes Anatomicæ & Chirurgicæ cum Audaciſſimis Caſibus*, printed at *Amſterdam* in *4to.*

7. *Bem-*

7. *Beukelmann,* } both famous Pra-
8. *Petrus Adrianus,* } cticers.

9. *Stalpert Vander Wiel* in his *Anatomicæ & Chirurgicæ Obſervationes* in *Latin* and *Dutch.*

Theſe are the principal Authors as I know of.

PART II.

Diætetice, *and the* Praxis Medica Interna.

DIÆTETICE.

Diet properly ſignifies a Regimen of Food, but *Diætetice* is now uſed to ſignify the whole Regimen of a ſick Perſon, as to Meat, Drink, Sleep, Retentives, Motion, Reſt, *&c.* There are very few good Authors on this Subject, but theſe following are the chief, *viz.*

1. *Hippocrates* in his Treatiſe *De Victu in Peracutis*, as alſo in his Treatiſe *De Victu in Acutis.* Add to him

2. *Galen De Victu Ægrorum*, for perhaps there is no one better.

3. *Peter Girardet* in his Commentaries *in Diætam Acutorum Hippocratis* in 8*vo.* printed at *Paris* in the Year 1631.

4. Read *Arnold De Villa Nova*, an *Italian*, the Pope's Phyſician, *De Preparandis Cibis & Potu Ægrorum.* In the firſt Tome of his

Works in three Tomes in *Folio.* Add to theſe

5. *Sydenham*; than whom I do not know of any that have written better.

Theſe Authors have treated this Subject very ſeriouſly, and adviſed nothing but what may be Serviceable, and you have in them all you can deſire.

Of the Praxis Medica Interna.

In the Study of inward Diſtempers, or the Advice how to make proper Medicines to be taken inwardly, we muſt be very careful in recommending Authors: For in this Caſe Miſtakes would be of a very fatal Conſequence. I ſhall therefore ſpeak here only of ſuch as I my ſelf have made uſe of, or who have been commonly cried up and commended.

All thoſe from whom we may learn the Nature of inward Diſtempers I divide into theſe three general Claſſes following, as you ought to do in your Libraries.

1. *Into thoſe who have written* Syſtematically.
2. *Thoſe who have written of particular Diſtempers.*
3. *Thoſe who only have deſcribed their Obſervations.*

1. A Syſtem is a ſure, entire, well order'd *Compages* of a certain Art, in which is preſcribed the Inſtruction of all thoſe things which are required in curing Diſtempers: In no Part are there more Authors than in this if you regard their Promiſes; but none fewer if you conſider their Merit, and whether they have ſtood to what they have ſo largely promiſed.

2. Thoſe only have deſcribed particular Diſtempers who have ſo penetrated into every thing that belongs to ſuch or ſuch a Diſtemper (in as much as it is knowable to Man) that nothing remains undeſcribed of its *Phænomena*, *Curing*, and *Events*. What Good is to be found in the *Syſtematicks* is derived from hence; for they muſt firſt know all particular Diſtempers.

3. The *Obſervators* are all ſuch Authors who have deſcribed inward Diſtempers, and who have not treated of this or that Diſtemper only, but of every one whatſoever in its Riſe, Progreſs, Effect, Remedies, Tractableneſs and Pertinacy, as alſo thoſe obvious Mutations which have happened in any Caſe. Theſe have made Obſervations on every thing that has happen'd in Life, or after Death; in the firſt the beſt is *Hippocrates*, after him thoſe who have diſſected by his Obſervations, and thence arrived to the utmoſt Perfection.

I. CLASS.

I. CLASS.
SYSTEMATICKS.

Amongſt theſe,

1. *Hippocrates* is the firſt, his vaſt Volume is not to be read in the Order it is written, but firſt of all his *Aphoriſms*, which contain all phyſical practical Axioms, and ſuch as for Twenty Three Ages were inconteſtable, and to which all Phyſicians, in their ſeveral Controverſies with each other, always referred themſelves (except in ſome few Things which ſeem to be foiſted into his Manuſcripts.) Theſe are confirmed by a Thouſand Caſes in getting, demonſtrating, and curing Diſtempers. He wrote in ſuch a Style as ſcarce any one now-a-days underſtands, and they who have tranſlated him have done it according to their own Capacity; if any one reads him untranſlated he will find it the greateſt Difficulty in the World to underſtand his Meaning. You muſt therefore have Recourſe to his Commentators (to whom all ſuch Perſons are much indebted) the moſt skilful in the *Greek* and *Latin* Languages, and the moſt converſant in ancient Writers (for *Hippocrates* had a Family, and he communicated his Domeſtick Method of Phyſick only to his own People, and which continued for a

Hundred Years in the Family of *Aſclepiades* to *Auguſtus* ſo called.) The beſt of theſe Commentators is;

1. Galen, *who commented on* Hippocrates's *Aphoriſms; after him no one better than*
2. James Holler *a Profeſſor of* Paris *and Reformer of Phyſick, whoſe Commentaries are practical and moſt ſtrong and nervous.*
3. Valeſius *wrote Commentaries on* Hippocrates *in Eleven Books in* Folio; *what the Ancients and others taught of the Aphoriſms of* Hippocrates *you may find in him. He was a* Spaniard *and a Perſon of conſummate Learning. If you can get theſe Books you have no Occaſion of any other, for other Authors generally run into Errors, becauſe they write out of their own* Hypotheſes, *not by Obſervation. In the next Place you ought to obſerve his* Præcepta Medica; *where he deſcribes ſome Precepts in Curing. And laſtly, the whole Section of* Fœſius's *Edition, which ought to be read before you undertake to practice; and there you will ſee ſeveral general Precepts relating to the Diet of ſick Perſons and thoſe that are in* Health; *or ſuch as labour under acute Diſtempers,* &c. *of want*

want of Sleep, Aliments, and the Office of a Phyſician. All this may be read and eaſily underſtood in three or four Days, for here Hippocrates *is not ſo obſcure.*

2. The Second practical *Syſtematick* is *Aretæus* a *Cappadocian*, and I think this Author to come the neareſt to *Hippocrates* of any we have, for he did not live long after him. There are two Treatiſes of his, in both which he gives us ſeveral general Inſtructions in Relation to Medicines and the *Ratio Medendi*. *Hippocrates* wrote every thing very confuſedly, but this Author did not digeſt only one or two things, but every thing *Syſtematically*. I do not ſee that the nervous Style of *Aretæus* is much inferior to that of *Hippocrates*, and then he obſerves greater Order. His beſt Edition is only in *Greek*, printed in 8*vo* at the Royal Preſs at *Paris*, but it is ſcarce to be had. The *Augsburg* Edition in *Folio* is likewiſe very beautiful.

3. The Third in this Claſs is *Aurelius Cornelius Celſus*, who lived in the Reigns of *Auguſtus* and *Tiberius*, and after *Aretæus* is the next to *Hippocates*. This Author is the beſt one can truſt to in informing us of *Hippocrates*'s Opinion, and if we were without him we ſhould make a Thouſand

Miſtakes in reading *Hippocrates*; for in his Time the *Latins* learned the *Greek* Language as we do now the *Galenical*, and at that time likewiſe the *Bibliothecæ Alexandrinæ*, *Romanæ*, &c. were in being; as alſo a great many of *Hippocrates*'s Manuſcripts. You cannot follow a better than *Celſus*, for he explain'd *Hippocrates* and *Aretæus* in a moſt eaſy, ſtrong, yet ſmooth Style. This Author, by often reading him will make excellent Phyſicians, and from him only you may know how the Ancients cured Diſtempers by *Friction*, *Bathing*, &c. without a huge Gallimawfry of Medicines. The *Elziver* Edition is the beſt, it was printed in the Year 1650 in 12*mo* by *Vander Linden*, which is entirely corrected from his Manuſcripts. The *Antwerp* Edition in *Folio* is likewiſe very good; but this is to buy Antiquity too dear; this was likewiſe peruſed by *Vander Linden*.

4. The Fourth is *Galen* whom I have ſo often mentioned in this Work.

5. The Fifth in order of Time is *Paulus Ægineta* a *Greek* Author later than *Galen*, 450 Years before Chriſt, *Aretæus* about a 100 and more after *Hippocrates*, and *Celſus* flouriſhed about the time of Chriſt, *Galen* in the Year of our Lord 140, *Ægineta* about the Year 300. This learned Man is certainly the beſt Phyſician *De Re Medica*.

He wrote Seven Books which contain every thing relating to internal and external Practice, but his Style and Method are entirely *Galenical*, that is, altogether *Ariſtotelian* in his Arguments. This Author amended all what *Galen* had before written in three large Volumes in *Folio*, made eaſy what was difficult, digeſted what lay confuſed, and reduced all things that were ſcattered about in *Galen*'s Works under certain Heads. Read what Author you pleaſe after *Ægineta*, and you will find ſuch Authors Writings to be the ſame with his; for as *Ægineta* lay buried up in Manuſcripts, other People made bold to ſuppreſs his Name and publiſh his Works for their own. He is a moſt exact Author, but for Gravity is nothing like the three firſt I mention in this Place, for he ever follow'd *Galen*'s Doctrine. His *Greek* Works are very ſcarce. The *Greek* Edition is abſolutely the beſt, and is that of *Aldus* (which is very dear) in *Folio* printed in the Year 1538; (it is very hard to be got being ſnatched up into Libraries, eſpecially thoſe of *England*) for at that time Printers were very learned Men, as *Aldus*, *Stephanus*, &c.

6. The Sixth is *Aetius Amadeus*, whoſe Work after the three former Authors is moſt excellent, and is called *Tetrabiblos Medica & Jatrica.* Before you publiſh

any thing relating to any Diſtemper, conſult *Aetius*, for he has an admirable Index. He collected all things that lie diſperſed in *Hippocrates*, *Galen*, and others, ſo that in my Opinion this Book ought to be compared to *Juſtinian*'s *Codes*, which *Fabian* reduced and digeſted under ſeveral Chapters. If, for Example, you would know what the Ancients thought of the *Pleuriſie*, you will find the Sentiments of Fifty Authors which you could not know but from *Aetius*. The beſt Edition is in *Greek* in *Folio* by *Aldus* in the Year 1534.

7. *Alexander Trallianus* follows next in Order of Time: This Author is very ſhort, his Writings are ſupported by *Galen*'s Authority, but they have notwithſtanding ſeveral beautiful Paſſages. No one ought to be without this Book, it is printed at the King's Preſs in *Paris* in *Folio* only in *Greek*, in a pretty large Volume; it is eaſily underſtood, but it was likewiſe printed in *Latin* and *Greek* at *Baſil* in 8*vo* in the Year 1556. He preſcribes proper Remedies for every Diſtemper, and is really very good, as may appear by his Treatiſe of the Worms, which is not in this laſt Edition.

8. *Oribaſius* was a Writer of the next Age (for now the *Greek* Language began to decay.) He was Phyſician to *Julian* the Apoſtate, and reduced into a regular Sy-

ſtem every thing he found looſe and indigeſted in other Authors; the Emperor employ'd him in this Work that he might make a Collection, and explain, in one Volume, the Sentiments of all preceding Phyſicians. This Book was printed at *Baſil* in 8*vo* in the Year 1557. Compare this Author with all others and you will find he very commodiouſly explains the Opinions of the Ancients on every Diſtemper; and gives us frequently an Opportunity of inventing Medicines for Diſtempers not eaſily curable; his Advice is excellent, and his *Materia Medica* incomparable.

Here ends the *Greek* School. I ſhould do ill not to recommend to you the Merits of theſe Authors; you muſt buy the Editions I here mention, which have all of them very curious Indexes; nor can I recommend to you any other amongſt the *Greeks*. I can find every thing almoſt in *Aetius*. Since the *Greek* Tongue was ſeldom read by Phyſicians, *Stephanus* gave his Aſſiſtance, who by his applying himſelf to the publick Good reduced himſelf to an extreme Poverty. He was learned in the *Greek* and *Latin* Tongues, and put out the Works of the principal Phyſicians after *Hippocrates* and *Galen*. You have from him all the ſaid Authors, except theſe two laſt mentioned, and ſeveral other *Romans*. He wrote an Index full of great Learning, which contains the moſt minute Particulars; for Example, *The Cauſe of Madneſs* in *Aetius*, &c. ſuch a Page. Its Symptoms, Cure, *&c.* in *Ægineta*, &c. ſuch a Page, *&c.* It is two Volumes in *Folio*, tho' ſometimes bound up in one about two Hands breadth in a very ſmall Character: Heretofore this Work was bought for three Florens, but it is now ſnatched up into Libraries. You may truſt to this Verſion more than any other.

Amongſt the *Roman* Authors the

1. Is *Celſus* before mentioned.

2. C. *Pliny*, who was a Perſon of a vaſt Genius, tho' no Phyſician; he collected what he could out of ſome Thouſands of Volumes in the time of *Veſpaſian* for his Natural Hiſtory. The Edition of *De le Campius* [or *Des Champs*] a *French* Phyſician, may be bought any where; this Author indeed is not ſo valuable as any of the foregoing, but yet we cannot be without him; for he has ſeveral Things which others do not mention, and many things not to be met with in *Dioſcorides*.

And here the *Romans* left off, for the others who wrote in the *Latin* Tongue were of all Nations. After theſe I do not know any one I can recommend to you; for all others are purely *Galenical*, and ſo much verſed in the *Ariſtotelian* Philoſophy, that they are therefore not worth your Notice; you loſe your time in reading them, for they give but very bad Informations.

All thoſe that came after were *Arabians.* For after the *Vandals* had deſtroyed all Letters, and the *Moors* came out of *Africa* into *Spain*, when they were thence driven out they carried back with them a great many Books, and ſet up in the Cities of *Fez* and *Morocco* Libraries and Univerſities, and applied themſelves to the Study of Phyſick out of thoſe Spoils they had brought along with them from *Europe.*

The *Arabians* of all Men were of an excellent Genius and Penetration, the chief of whom were *Avicenna*, *Almanzor*, *Rhaſes* and a great many others I cannot name. *Hippocrates* and *Galen* had been tranſlated into *Latin*, and then the Science of Phyſick began to be entirely *Arabian*; and as they had every thing from *Ariſtotle* and *Galen*, they abounded with the Chimeras and Trifles of the Peripatetick School.

From the Sixth Age to the Year 1507 every body almoſt followed the *Arabians*, and their Writings accordingly were ſuitable to their Notions.

Of the Arabian *SECT.*

Of this Sect the beſt Author is

1. *Hieron. Capivaccius* a practical Profeſſor of Phyſick. He was moſt famous all over *Italy.* He wrote a Treatiſe entituled, *Medicina Practica* in Seven Books, printed at *Franckfort* in the Year 1594; in him you will find a Syſtem of all Diſtempers, their Deſcription and Method of Cure. He acquired great Riches and Honours. When he was asked what Secrets he made uſe of, he replied, *When you know me you will know my Secrets.* You may notwithſtanding do very well without him, ſince he is too trifling like the *Arabians*, and too full of Words with the Peripateticks.

2. *Felix Platerus* wrote a noble Treatiſe called *Medicinæ Praxis*, than which nothing can be better, only that he abounds with too many Remedies; but in digeſting of Diſtempers he is by far the beſt of them all. This Book was printed in three Volumes in *Quarto* at *Baſil* in the Year 1656, which Edition is much more exact than that printed in the Year 1625: For the fifth Part, which the Father ſuppreſſed, was put out by the Son; I ſpeak of his Practical (not Anatomical) Works.

3. *Nicholas Piſo*, Father to *Charles Piſo*, wrote an excellent Treatiſe *De cognoſcendis & curandis Morbis*. This Book is in *Folio*, and may be had at *Wechel*'s for a ſmall Matter. The *Arabian* Doctrine corrupted all things hitherto; but theſe Authors I mention are the moſt pure and incorrupt.

And now the *Greek* Syſtem began to revive.

About this time they began to read *Hippocrates* again, eſpecially in *France*; [for People plainly ſaw *Galen* had corrupted a great many things by Philoſophical Notions.] Of theſe,

1. The firſt was *James Holler* in his Practical Works with *Duret*'s Notes. This is really a Golden Treatiſe. He was a moſt learned Man, and very skilful and moſt famous in Practice: He wrote when he was in Years; he is full of admirable Experiments, of exact Fidelity, and plain in Style. His *Medico-Chirurgica* are very excellent in that Book.

2. *Duret*, who wrote admirable *Scholia* upon *Holler*; you may buy this Book for a very ſmall Matter, for eight or ten Stivers; it was printed in *Quarto* at *Geneva* in the Year 1635.

To the *Syſtematicks* may alſo be referred ſome who have written other Peoples

Works. It is ſaid that nothing heightens and exalts a Genius more than Travelling, for by this Means thoſe Prejudices we have of Good and Bad, *&c.* are rectified, and that no Body is fitter to govern People than a Perſon thus accompliſhed. So likewiſe in Phyſick a Phyſical Genius can no ways be better improved than by reading the Methods of the *Egyptians*, *Indians*, *Perſians*, &c. for Experiments are proved by Succeſs, and where Men do not follow the ſame Opinions in Speculation, yet agree in Practice, it is the ſame thing.

Thus

1. *Proſper Alpinus* made himſelf well acquainted with the *Egyptian* Method of Phyſick. This Author was an *Italian* born, who, that he might learn the chief Seat of Phyſick went to *Egypt*, where *Hippocrates* gained all his Knowledge; and there he collected his Obſervations, which you may ſee in his Book called *De Medicina Ægyptiorum*; where you will find a great many of *Hippocrates*'s Obſervations likewiſe. The *Paris* Edition in the Year 1646 is the fulleſt and moſt compleat.

2. *James Bontius* born in theſe Provinces, heretofore Profeſſor in *Leyden*, undertook a great Journey into the *Eaſt-Indies*, as far as *Perſia*, *Java*, &c. that he might acquire the true Notions of the *Indians* relating to

their own Diſtempers. Never Man cured more Diſtempers by Simple Remedies than *Bontius*. Read him on the *Dyſentery*, *Contraction of the Nerves*, &c. His Book *De Medicina Indorum* is bound up with the *Medicina Ægyptiorum* of *Alpinus*, tho' you may buy it here at *Leyden* by it ſelf; it is a very little Book.

3. *William Piſo* wrote a Book at *Amſterdam De Medicina Braſilienſi vel Indiæ Occidentalis*, you have it in his Works at large printed in *Folio* at *Amſterdam* in 1648, where 8
you may likewiſe have

4. *Markgrave's Opera Braſilienſia*. Nor ſhould we make ſlight of the Method of theſe *Indians* in Phyſick, for there are no where People of a greater Genius and healthier Body, than theſe People living in thoſe Countries commonly to a Hundred Years.

5. *Guten Rhyne* wrote a Treatiſe *De Chinenſium Medicina*. This *Hollander* for many Years together, in the *Eaſt-Indies*, dived into the *Arcana Medicinæ* of the *Chineſe*.

II. CLASS.

Authors on particular Diſtempers.

Theſe following are the Authors who have written on particular Diſtempers only.

1. *Hippocrates* in his Books *De Affectibus & Morbis internis.*

2. *Cælius Aurelianus*, but this is a Writer whom we have great Reaſon to doubt of. His Style is ſcarce intelligible, and ſo very barbarous, that one can hardly find out his Meaning; but yet his Matter is moſt excellent: He wrote *Of the quick and ſlow Paſſions*, as alſo ſomewhat of Surgery, which Book is quite loſt. His Works are printed at *Amſterdam* in *Quarto* by *Wetſten*; but the beſt, and which is to be had almoſt any where, is *Helvetius*'s Edition printed above two Years ſince. I take this Book to have been written by *Soranus* of *Epheſus*, for it is impoſſible for a Man who had compoſed ſuch beautiful Monuments in Phyſick to write in ſo barbarous a Style; which makes me think that that noble *Epheſian* [*Soranus*] who was thought to be loſt, was tranſlated in *Africa* into *Latin* by *Cælius Aurelianus*, which Tongue he did not very well underſtand; he has notwithſtanding every where hit the Senſe of the Author. In this Book the Signs and Preſages of Effects are admirable, and the Sentiments of all Phyſicians that preceded him are here collected; he very exactly tells us all even the moſt minute Signs of the Diſtempers he deſcribes, and alſo what Effects are likely to follow; nor is there any Author, that has

come to our Hands, who deſerves more than this. Next to him

3. Is *Bellonius*, whoſe Works were printed at *Paris* in *Quarto* in three Volumes in the Year 1640; as many Authors as have read *Bellonius*, and underſtood his Method, have unanimouſly commended him. He wrote every thing in a moſt compendious yet elegant Style, and with the Exactneſs of *Hippocrates* without any Prejudice; he is uſeful both for the Study, and the Chamber of the Patient. He wrote *De Morbis Virginum & Mulierum Epidemicis* and ſeveral other different Subjects, as alſo on *Hippocrates*. If he can be bought for a moderate Price let every one get him. Add to him

4. The Compendium of thoſe three moſt noble *Engliſh* Authors in Phyſick, *Morton*, *Harris* and *Lyſter*, as printed in *Germany* in one Volume. *Morton* wrote practically, but he was too fond of ſome certain Medicines. He is a Writer that has ſeen a great deal, made a great many curious Obſervations which he very candidly delivers down to us. *Harris* is without his Equal in his Way, whom I always found in Practice to have ſaid every thing very true; for Example, in ſucking Children, that many of their Diſtempers were owing to indigeſted and coagulated Milk. Next follows

5. *Sydenham*, whom no one ought to mention but with Honour. This Author laying aſide all the Pomp of Learning and Syſtems, did nothing elſe but obſerve by the *Clinica Methodus* of the Ancients what happen'd in Diſtempers. He was excellent in this, that one may ſo know the Nature of Diſtempers as to admit no deductory Concluſions, to uſe no Authors, nor take up any Prejudice; but he tells what pre-exiſted in the Body and Life of the Patient; for Example, that he fell into ſuch or ſuch a Diſtemper, then deſcribes after the ſame Method the Idea of ſuch known Diſtemper, that at ſuch a time there were ſuch Symptoms and what thence followed, and if he had the Aſſiſtance of any one he owns it; he praiſes nothing, but very plainly ſays, that ſuch a thing was effected by ſuch Means; then he obſerves the Iſſue and Event of ſuch Diſtemper as to Death, *&c.* and this he relates in ſuch manner that you can no where have a clearer Notion of its Nature than in the Writings of this Author; for Example, he ſays, that at five a Clock in the Afternoon in the fourteenth Day of the Small Pox, when the Patient was ſuppoſed to be pretty well recovered, he began to breath with much Difficulty, grew delirious, fell into Convulſions, and at ſuch a time expired. So in like manner

he deſcribes the Events of other Diſtempers; for Example, he tells us of one who to all Appearance was recovered from the Small-Pox, had Supputations at the Joynts which he cured after ſuch a manner. If a Diſtemper was curable he deſcribes the Signs that indicated ſuch future Cure; I know no one like him, his Method is moſt excellent. He ſaid, That when a ſecond Diſtemper came upon a Man during the firſt, one muſt give way to the other; in the firſt Place he made his Obſervation on the Progreſs of the Diſtemper by doing nothing at all, and thence framed his Method of Cure. He then obſerved by the Application or Omiſſion of what things a Diſtemper grew moſt violent, and by the Application or Omiſſion of what, it grew more quiet and eaſie, and thus diſcovered an almoſt never erring Method. But this Method has one very great Inconveniency in it, and that is, it is ſuch a long time before we can be able to know any thing. Now Diſtempers have a great many things common, as for Example, in all Inflammatory Diſtempers letting Blood takes away their firſt Root, then purging Clyſters muſt be uſed, and Anodynes in the Evening, and thus all ſuch like Diſtempers are cured. For by his Obſervations on the Small-Pox, Inflammation in the Lungs, Pleuriſie, *&c.* you will ſee that all what I have mentioned comes to paſs, and therefore we muſt not always proceed by that Method, where there are ſo many Experiments to be made before any thing is to be done. In his *Schedula Monitoria ultima*, which I look upon to be the beſt of all his Writings, he ſays, he learned that ſeveral Diſtempers, which he particularly deſcribes, may be cured by a ſure Method; and he ſaid this after a long Courſe of Practice. But I do not adviſe you, as he does, to read no body at all, for the time that others ſpent in reading he paſt in Obſervations; for Example, he obſerved that after fourteen Days a Pleuriſie never ended in any other Diſtemper, which yet you will find to be otherwiſe in my Book printed for the uſe of Families. Thus therefore are our Obſervations to be continually augmented and corrected by thoſe of other People; and certainly he would have written much better had he conſulted other Authors. However in his Cure of the Plague he quoted ſeveral, and by their Opinions confirmed his own. In this his Intention was, that we ſhould paſs our whole Life in making Obſervations only.

6. *Chriſtopher Bennet* a *London* Phyſician put out a ſmall Book in 8*vo* printed at *London* in the Year 1654, which was reprinted two Years afterwards in *London*,

as alſo at *Franckfort*; the Title of the *London* Edition is *Veſtibulum ad Theatrum Tabidorum*, his Obſervations are moſt profound, and received with the greateſt Applauſe. He promiſed to put out another perfect Work, *viz. Theatrum Ipſum Tabidorum*, which made the *German* Printers in their Edition inſtead of *Veſtibulum* to put *Theatrum Ipſum Tabidorum* in the Title Page to make it ſell the better. But I cannot ſay whether the Author ever finiſhed that Work, or whether he died before. He wrote likewiſe a Treatiſe *De Phthiſi & de Morbis Pulmonum*; he treated of their Origin, Nature, Secretion by Spitting, *&c.* very profoundly. One thing amongſt all the reſt he took particular Notice of, and that is, he ſays, That a *Vomica Clauſa* in this Diſtemper would either conſume or be excreted by Spitting, which had eſcaped the Obſervation of all other Phyſicians. He likewiſe obſerves that one Sort of Meat by its Quality leaves in the Body ſomewhat which cannot be perſpired, and demonſtrates that theſe Particles being carried into the Blood, and being inſeparable, cauſe Articular Diſtempers, Rheumatiſms *&c.* but if there be a Coalition or Aggeſtion of theſe in the *Fiſtulæ Pulmonales* it will cauſe difficult Reſpiration and a Cough, which will terminate into Spitting, *Vomica* or Impoſthume, or the

Deſtruction of the Lungs; whatever others have written of this Diſtemper you will find in him. He ſays, That the Dropſie, before it has gathered any Water may eaſily be cured, but not afterwards, for then it is inſuperable. He demonſtrates from the Colour of the Spittle, the Nature of the Diſtemper; for Example, if it be Dark and Aſh coloured ſuch a Matter is gathered together, and that by ſuch a Method it requires ſuch a Medicament or Medicine; and that Milk may cure one Man and kill another, which no one ever wrote of but himſelf. He was a Man of conſummate Learning, and of the *Engliſh* Writers it muſt be allowed that they ſtick, very candidly and without Prejudice, cloſe to Truth, and write with Eloquence and a great deal of Life and Spirit. This Gentleman was troubled himſelf very much with the Phthiſick, and had a great many of his Friends under his Care that laboured likewiſe under the ſame Diſtemper, and thus he found out and collected every thing himſelf very compendiouſly, not from Arguments but from above a Hundred Obſervations; However ſcarce one of a Hundred of his Readers will perhaps underſtand him, his Obſervations are ſo very profound; I have my ſelf very often, when I have been doubtful what to do to my

Patients, have had Recourſe to him and found the greateſt Aſſiſtance.

7. *Herman Vander Heyden* wrote in the *Walloon* Language (thoſe that underſtand *Montaignes French* may underſtand him) ſeveral Obſervations on the Gout, Rheumatiſm, Laske, Bloody Flux, articular Diſtempers, and the like. He demonſtrates that all theſe are rather cured by refrigerating Medicines than hot. He put out a Treatiſe of cold Water to be uſed in curing Diſtempers either by drinking it or Immerſion; whence the uſe of Immerſions in cold Water are now a-days ſo much in uſe. He wrote this Work while he practiſed Phyſick, in *Quarto*; it was then publiſhed by Pieces in a ſmall *Octavo* or large *Duodecimo*. He wrote another Book in *Latin* but not ſo good. But you muſt obſerve this is not the ſame Perſon with *Vander Heyden* who wrote a Book of Anatomy in *Zeland*.

8. *Conrad Schneider* put out a Treatiſe *De Morbis Catharroſis*.

9. *John Baptiſt Helmont* wrote alſo very well of ſome Diſtempers, but he muſt be read with Prudence. He was the firſt good Writer that ever wrote *De Lithiaſi ſeu Seminali Diſpoſitione in Corpore ad Concretiones Calculoſas*; for other Matters I cannot re-

commend him, for he was a moſt violent Chymical Phyſician.

10. *Bellini* on the Pains in the Head and Breaſt, and Fevers, is abſolutely the beſt Author that ever was, but not in reſpect of Method of curing. He wrote admirably well of *Prognoſticks* and *Diagnoſticks*, and indeed as often as I turn over this Author I cannot believe it to be the Work of one Man, but that he collected what was communicated to him by a great many others. In the Apoplexy he teaches us what is *Antecedent*, *Concomitant* and *Subſequent*. He brings in Anatomy, and ſays, That in ſuch a Part there is ſuch a Matter which has ſuch an Efficacy: ſcarce any Man reaſoned better. I could have placed him in the Number of the *Semeioticks*, but he is alſo very good on Diſtempers themſelves; he gives a good Reaſon for Diſtempers, which I my ſelf have obſerved in my Patients to be true.

11. Of the *Lues Gallica*, or *French* Diſeaſe, and every thing relating to it, I ſhall only recommend to you one Work, and that is very ſcarce, *viz.* the *Variorum Opus* printed in two Volumes at *Venice*, in which you will find collected by the moſt skilful Perſons all things both Ancient and Modern (relating to this Malady) to the very time of its Edition; and this Work will ſupply the Place of a whole Library on this Subject.

I come now to mention ſuch as have written

De Morbis Mulierum.

Authors who have written on this Subject are

1. *Bellonius* in his late Treatiſe *De Morbis Virginum ac Mulierum.*

2. *Mercatus* in his Book *De Morbis Virginum*; there is only one Edition of this Work.

3. *De Morbis Gravidarum, Puerperarum Parturientium*, &c. *Mauriceau* alone is ſufficient in his two Treatiſes; in the firſt he admirably well diſcourſes *De Morbis Gravidarum & Puerperarum*, and the ſecond is full of excellent Obſervations relating thereto. He writes in a very plain Style without Argument, after a long Experience, and we cannot expect any thing more perfect on any one particular Diſtemper. I could add ſeveral others, but if you have theſe you need deſire no more.

III. CLASS.

OBSERVATORS.

Obſervation is a ſimple, natural, true Enumeration of all thoſe things which may be taken Notice of by the external Senſes in any ſick Perſon. There are ſome who think there is nothing more eaſy than to publiſh Obſervations, but in reality there is nothing more difficult. I ſhall not here recommend to you thoſe who have aſcribed the Events of Nature to their Medicines, but thoſe who have made their Obſervations after a long Experience; for there are a great many who have publiſhed their Obſervations where a natural or ſpontaneous Cure of Diſtempers is aſcribed by an Author to ſuch or ſuch a Medicine, and this I could ſhew you did I not hate Envy: I ſhall therefore only recommend to you the moſt candid, and the chief of theſe are

1. *Charles Piſo*, that incomparable Phyſician of *Lorrain*, who wrote a Book *De Morbis a Seroſa Colluvie ortis* (before *Harvey*) printed in *Quarto* in the Year 1618; but the fineſt Edition is that with Marginal Indexes referring to the Contents in *Octavo* printed by *Hackius* in the Year 1650. This Author was well skilled in the *Greek*, *Latin* and *Arabian* Tongues; he was Son to that noble Profeſſor of Phyſick *Nicholas Piſo*; he applied himſelf from the Beginning to the Study of Phyſick; after much Travelling and a long Experience he thought on this Book, wherein he refutes the Chimerical Notions of *Galen* and the *Arabians*, tho' he was of that Sect. This Book may ſerve

as a Pattern to all Writers of Obſervations. He firſt obſerves the Antecedent Cauſes of a Diſtemper both within and without the Patient, then how the Diſtemper begins, ends and is cured; or if the Patient ſhould die, he Anatomically deſcribes the dead Body, and that with the greateſt Exactneſs; and at laſt makes a Concluſion of the Nature of the Diſtemper. This Book is very ſcarce, but I hope I ſhall take care ſhortly to have it reprinted, ſince it is ſo much hoarded up in Libraries.

2. After him comes *Petrus Forreſtus*, tho' not comparable to him. He at firſt began to read Lectures of Phyſick in this Univerſity, but did not long continue in that Station, having heaped up immenſe Riches, and after fifty Years Practice of Phyſick, which he learned in *France*, *Italy*, &c. (for he practiſed almoſt all over *Europe*,) at laſt had a moſt ſplendid Practice at *Delft* and the *Hague*. His Obſervations are written with great Fidelity, having *Scholia* annexed to every one of them, where he tells you every thing that the Ancients, *Greeks*, *Romans*, *Arabians*, or the Followers of the *Arabians*, had amongſt them worth taking Notice of. It is a moſt compleat Work. He wrote on Surgery as well as Phyſick. His Works are printed at large at *Roan* in *Normandy* in *Folio* in the Year 1654. The other Editions

are good enough, but this is the beſt becauſe of the Index.

5. *Theophilus Bonet* wrote his *Sepulchretum Anatomicum* in two or three Volumes in *Folio*. This Author ſtudied Night and Day on that Work, that he might collect out of all Authors ſuch Obſervations as they made on dead Bodies. Every particular Place is mentioned in the Index; you will read him a thouſand times over to inform your ſelves in the Notion of a Diſtemper. He briefly deſcribed the Symptoms while the Patient was ſick, and afterwards what he obſerved in his Body when he was dead. He does not make uſe of much Argument. I have known many a one made a good Phyſician by uſing him, nor can we want him without great Inconveniency.

4. *John Schenkius* wrote his *Obſervationes Medicæ ac Chirurgicæ*, printed in *Quarto* in *Germany*. This Author is very faithful and exact and eaſily enough to be had.

5. *Nicholas Tulpius*, a Phyſician very well received every where; at Fourſcore Years of Age he wrote to his Son *Peter* his more curious Obſervations which he made in his moſt excellent Practice at *Amſterdam*; the laſt Edition which contains above a hundred Obſervations is what you muſt buy. It was printed by *Elzevir* in 8*vo* at *Amſterdam* in

the Year 1672. This Book is well known. Next to him follows

6. *Felix Platerus* in his Obſervations (I recommended him amongſt the *Syſtematicks*) who lived to a great Age. His Son perfected this Work; it is entituled, *Obſervationes Medicæ*, and printed in three Books in *Folio* at *Baſil* in the Year 1623.

7. There are likewiſe Collections of Obſervations written by ſome Authors, called the Curious Miſcellanies [*Miſcellanea Curioſa*] in a great many Volumes in *Quarto*, or the *Ephemerides Academiæ Leopoldinæ*, inſtituted by the Emperor *Leopold*; its Members were diſperſed all over *Africa*, *Aſia*, &c. and they were obliged by certain Statutes to ſend to the Preſident every thing they obſerved relating to Phyſick, Chymiſtry and Natural Hiſtory. There are indeed a great many Trifles intermixed, but they are eaſily diſtinguiſhed. No body can be well without theſe, though they are very dear: I am very ſorry they have been left off for theſe two Years.

8. It is likewiſe great pity that *Du Blegay* has diſcontinued his *Journal des Sçavans* (that Zodiack for Phyſicians) which was firſt publiſhed in the Year 1685, and continued for ſome time in ſeveral Volumes in *Quarto*; in which that Author digeſted the moſt curious Obſervations of the *Perſians* and others that communicated

them to him. There are in that Work a great many things worth your reading.

Beſides theſe there are a hundred others who have made their Obſervations, but theſe only I have now mentioned pleaſe me. *Sydenham* ſays, That nothing hurts Phyſick ſo much as particular Obſervations, for we can improve nothing by them, ſince perhaps in the next Year another Man will publiſh thoſe that are quite contrary. But to write Obſervations well, all the Characters and Conditions aforeſaid are to be required which all thoſe Authors I have mentioned were Maſters of.

ADDENDA.

AUTHORS that have written,

De Conſilio Medico.

A Great many very grave Authors in Phyſick have undertaken to communicate their Thoughts about the Direction of this Study; amongſt whom there are ſome who quote Modern Phyſicians only, others have given us a Method how, and what Authors are to be read, as

1. *George Walter* wrote a Book on this Subject, called *Sylva Medicorum* in *Quarto*, printed in the Year 1675.

2. *Hermann Coryngius* a *German*, that incomparable Profeſſor at *Helmſtadt*, who contended with others for the Palm. He wrote a Book called *Introductio ad Univerſalem Medicam*, printed at *Helmſtadt* in 4to in the Year 1654. He had read much and with an inimitable Diligence, and retained the Opinions of all Authors to a Miracle, for he was wont to cite the Pages of Books *Extempore*; he was of ſo bright a Judgment that he was called from the Profeſſors Chair to be a Stateſman in *Germany* and left our Art. He wrote a great many fine Things.

3. *Gunther Chriſtopher Schellamer* put out this Book of *Coryngius*'s with excellent Notes in *Quarto*, printed at *Spiers* in the Year 1688; in which is likewiſe inſerted *Gaſpar Bartholin*'s Treatiſe *De Studio Medico inchoando & continuando*, as alſo the *Conſilium Medicum* of *Peter Caſtelli*, who was a *Roman* Doctor and chief Profeſſor of Phyſick at *Meſſina* in *Sicily*, otherwiſe called *Optimus Medicus*; in which he tells you the beſt Authors in every Part. In that Book alſo, you have *John Vander Linden*'s *Manuductio ad Medicinam*, as alſo *Rhodius*'s *Introductio ad Medi-*

Medicinam, which otherwiſe would never have ſeen the Light. This Book deſerves to be read by every body. *Schellamer* is ſtill living, and this very Year about two Months ſince he ſent me his Book in *Quarto*, entituled, *Via Regia ad Artem Medendi*, where he acts with much Candour in his Direction of this Study of Phyſick; and I am glad you can add this Book to the reſt.

II. There are ſeveral other Authors who have written *De Conſilio Medico*, and the Choice of Books which will give an inſight into all Authors who have written of Phyſick; as

1. *John Ant. Vander Linden De Scriptis Medicis*, printed at *Leyden* and afterwards at *Norimberg* in *Germany* with Additions, entituled, *Lyndenius Renovatus*. You may have it any where.

2. *Lypenius* in his *Bibliotheca Medica* in *Folio*. This Author, with the Aſſiſtance of ſeveral others, took the Titles of Diſtempers, and under every Title put down the Names of the beſt Authors Alphabetically. And thus you have a moſt excellent Index of univerſal Phyſick, and he has left Spaces to inſert others.

I have now finiſhed this METHOD, I have told you what I know and what occurred to me in my firſt ſetting out in this Science, nor have I mentioned any Author I am not well acquainted with; and I hope for this my Advice you will retain a grateful Remembrance of your Profeſſor and Maſter,

Hermann Boerhaave.

FINIS.

THE INDEX.

COMPREHENDING

The Names of the Authors cited in this Work, the Subjects they reſpectively wrote upon, the Titles of their Books, their beſt Editions and Characters, all placed in the Order as they are to be read, and by which Gentlemen may guide themſelves in their Choice of Books, and erecting their Libraries.

Of the Nature of Bodies, Diverſity of Atoms, the Figure and Propriety of Bodies.

Democritus. *Page* 28
Epicurus. *ibid.*
Lucretius Carus. *ibid.*
Diogenes Laertius. *De Vita Philoſophorum lib.* 10. *de Vita Epicuri & Democriti.* *ibid.*
Peter Gaſſendi. His Commentary upon the 10th Book of *Diogenes Laertius*, printed in 4*to.* *ibid.*
Sir Iſaac Newton. 29
Hugens. *De la Lumiere & de la Peſenteur* *ibid.*

Keil. His Introduction to true Natural Philoſophy. *Page* 29
Andrew Taquet. His Arithmetick, in 8*vo.* 37
C. C. Preſter. *Elemens de Mathematique*, in two Vol. in *Quarto French.* 38
Euclid's Elements firſt ſix Books. *Furnier's* Edition with *Melder's* Notes. *ibid.*
Euclid's Elements. By *Barrow*, printed at *London.* *ibid.*
Clavius *on* Euclid. Printed at *Rome* in two Volumes *Octavo.* *ibid.*
Bernard Lami. *Elemens de Geometrie ou Traité de la Meſure de Corps.* Printed in *Octavo* in the Year 1655. 39
Philip Lansberg. *De Geometriâ Triangulorum lib.* 4. *Amſterdam* in 4*to*, 1631. 45
Andrew Taquet. His *Geometria Practica*, printed at *Antwerp* in *Folio*, 1669. 47
Adrian Vlacq. His *Tabulæ Sinuum & Tangentium.* Reviſed by *Francis a Schoten*, and printed at *Dort* in 1664. *ibid.*

In MECHANICKS.

Wallis. His Treatiſe of Percuſſion, at *Page 668*, printed at *London* in 4*to* in 1670. 66
The Royal Society of *England.* In their Philoſophical Tranſactions, *No.* 403. *London.* *ibid.*
Keil. His Introduction, *&c.* *ibid.*
Hugens. *Tractatus de Percuſſione* in his Poſthumous Works. Printed and ſold at *Leyden* by *Conteſtein.* 69 ~~*ibid.*~~
Galileus. *De motu locali & gravitate Corporum*, at *Lyons* and *Piſa.* 70
Alphonſus Borellus. *De vi Percuſſionis.* *ibid.*
Wallis. His Mechanicks, in *Quarto.* 71

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In HYDROSTATICKS.

Archimedes. *De his quæ humidis inſunt*, reviſed by *Barrow*, and printed at *London* in 1675. 74
Stevin. His *Hypomnemata Mathematica vel Hydroſtatica*, in *Folio*. *ibid.*
Wallis. *De Hydroſtat. Mechanicorum. London* in *Quarto* 1670. *ibid.*
Alphonſus Borellus. *De vi Percuſſionis*, at *Bologna* in *Italy*, as alſo by *Vander Aa*. *ibid.*
Mr. Boyle. In his *Hydroſtatick Paradoxes.* *ibid.*

On HYDRAULICKS.

Torricellius. *De Tubo Torricelliano.* 76
Benedictus Caſtelli. His Works, written in *Italian* in *Quarto*. *ibid.*
Monſieur L'Abbé Marriote. In his *Experimens Hydroſtatiques*, in 8*vo*. This Work is lately tranſlated into *Engliſh* by Mr. *Deſaguliers*, and printed at *London* in 8*vo* 1718. *ibid.*

On the other Proprieties of FLUIDS.

Sir Iſaac Newton. In his Philoſophical Principles, *Part Third.* 77
Hugens. In his Treatiſe of Gravity, Refraction and Light. 78
Borellus.
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On PHYSICKS.

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Pliny. Put out by *Delecampius* or [*Deſchamps.*] 83
Sir Francis Bacon *Lord of* Verulam. His Natural Philoſophy, printed at *Franckfort* in *Folio* 1655. 84
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The French *Royal Society.* In their Journal *Des Sçavans*, at *Paris* in 1665. 87
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The Hiſtory of all the Experiments made in the Univerſity of *Cementina* in *Tuſcany*, in *Italian* in *Folio* 1667. 89
Signor Abbate Roſati. In his *Giornale di Literati.* *ibid.*
Leopoldinæ Societatis *Miſcellanea Curioſa*, printed at *Leipſick*, begun in the Year 1670, and continued to the Year 1707 or 1708. 90
John Baptiſt Du Hamel. His Hiſtory of the Academy of *Paris*, in 4*to*, beginning from the Year 1665, and ends in the firſt Edition (which is the beſt) at the Year 1699. *ibid.*
Acta Leypſienſia, in thick Volumes, *Quarto.* 91
The French *Academiſts.* *Hiſtoire de l'Academie des Sciences*, beginning in the Year 1699. 92
Ulyſſes Aldrovandus. In his Works, in thirteen Volumes in *Folio.* 93
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